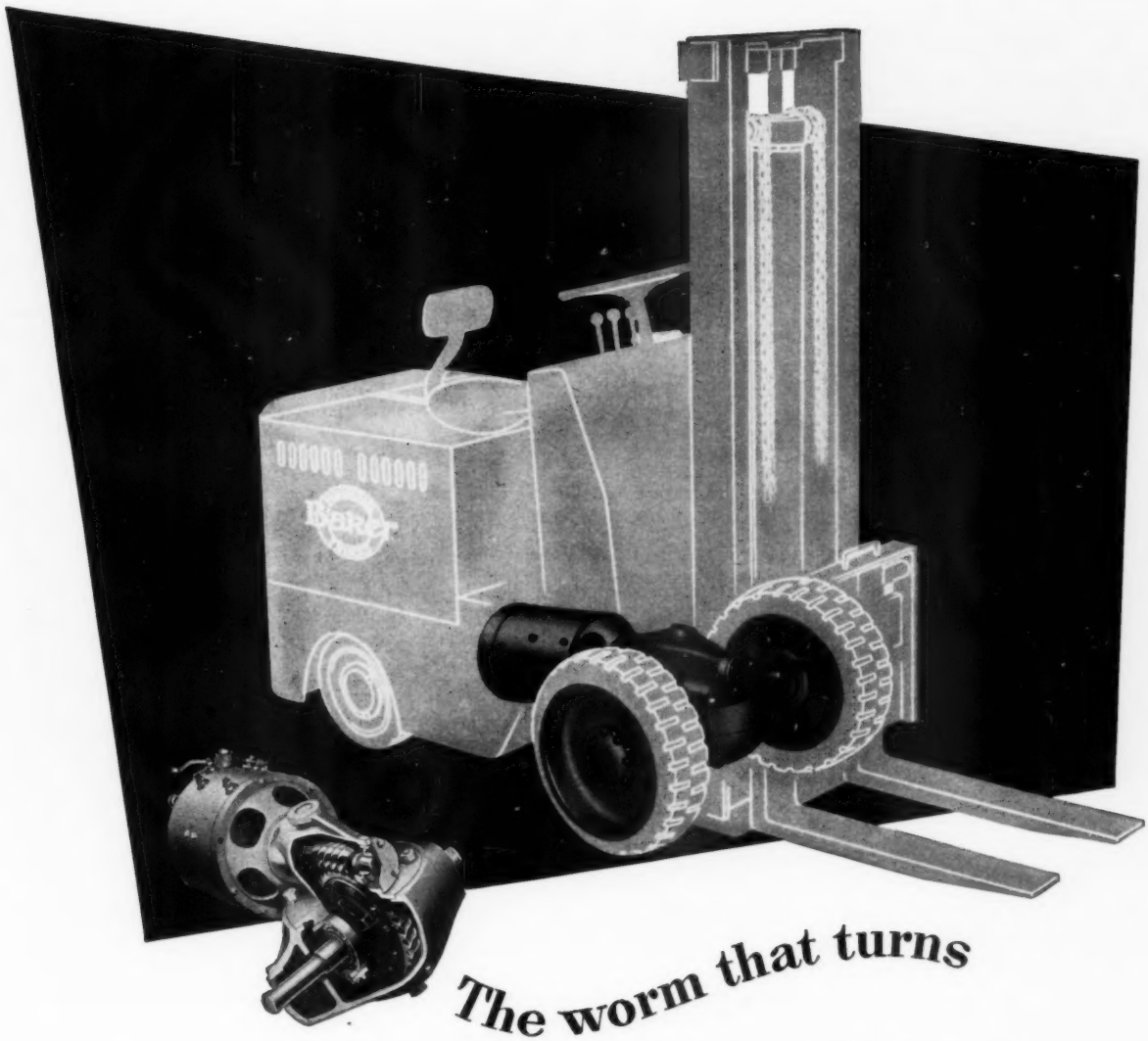

The worm that turns

...with ever-increasing efficiency

Baker Industrial Trucks use worm gearing in their drive axles, and here's why:

Industrial truck drive systems are called on for punishing, heavy-duty service. Truck operation is comparable to driving an overloaded auto constantly in low gear. Industrial truck transmissions change speed or direction as often as 1800 times during an eight-hour day.

The necessary gear reduction from motor shaft to drive wheels can be accomplished in several ways. The two most common are a gear train of two or more steps with spur or bevel gears, or single-step worm gearing.

The first means more moving parts, more maintenance, and compounded friction losses for each successive step-down. Development of the highly efficient involute worms, new lubricants and new tooth profiles, on the other hand, produce worm gearing efficiencies up to 92%—with fewer components.

One more point: Worm gearing actually increases efficiency with wear since the worm continuously regenerates the "ideal" tooth profile on the worm wheel. In spur or bevel gearing, efficiency declines progressively as teeth wear and lost motion develops.

For more detailed information on Baker Fork Truck features, write for 4-color sketch book—Bulletin 64. The BAKER-RAULANG Company, 1251 West 80th Street, Cleveland 2, Ohio.

Baker®
industrial trucks

For more facts circle 502 on Reply Card

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Editorial Director

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

New President for ESNE

Albert A. Fava was elected president at the annual meeting of the Engineering Societies of New England. The Society represents the 22 leading Engineering Societies in Metropolitan Boston and eight principal Engineering Societies in New England.

Mr. Fava is well-known in engineering circles and is an active member of the American Society of Mechanical Engineers, the American Society of Heating and Ventilating Engineers, and is a former president of the Plant Engineers' Club of Boston.

His early experience was in the construction, erection and operation of central power stations and for eight years in the field of plant engineering. He is now associated with the Lumsden and Van Stone Division of Midwest Piping Company.

A Dream Come True

MOVING SIDEWALKS are no longer an engineering vision but an actual fact with the recent installation of the first passenger belt conveyor for the Hudson and Manhattan Railroad.

Designed by the Goodyear Tire and Rubber Co. and the Stephens-Adamson Mfg. Co., this moving sidewalk is transporting homeward bound New Jersey commuters for a distance of 227 ft up an inclined ramp to the Erie railroad terminal. The moving rubber belt passenger conveyor negotiates a 10 per cent grade for the first 137 ft.

Operating at a speed of 120 fpm, the belt will deliver passengers who walk along its moving surface to the end of the ramp in 35 seconds compared with a normal up-grade walking time of 55 seconds through the regular passageway. It can handle 10,800 passengers an hour in a single direction at a speed of 1½ miles an hour.

Plant Construction News

Johns-Manville Corp. is building a new plant at Lompoc, California, for the manufacture of synthetic silicates from diatomite . . . **General Electric Co.** has completed the first phase of its plastics expansion program with an addition to its Taunton, Massachusetts, plant. Second phase will include more space at the Decatur, Illinois, plant . . . **F. J. Stokes Machine Co.** will enlarge its production facilities with the completion of the addition at the Northwest Philadelphia plant . . . **Luria Engineering Co.** recently doubled the size of its fabricating plant at Bethlehem, Pa., for the manufacture of standardized steel industrial buildings and aircraft hangars . . . **Tubular Products Div.** of **The Babcock and Wilcox Co.** will increase productive capacity for stainless steel tubular products with the completion of an expansion program at its Beaver Falls, Pa., plant . . . With two of the four production units in operation, the new Chemical Products plant of the **Aluminum Company of America** in Bauxite, Arkansas, is producing specially-calcined aluminas.

Plant Engineering Visits Trane

Plant Engineering's Editorial Director, Richard H. Morris, flanked here by Hunter Hughes, Maujer Publishing Co., and C. L. Ringquist, Trane Co., is pictured at the recent press preview of Trane Co.'s new Research and Testing Laboratory, in La Crosse, Wisconsin

Edge Insulation of Slab Floors

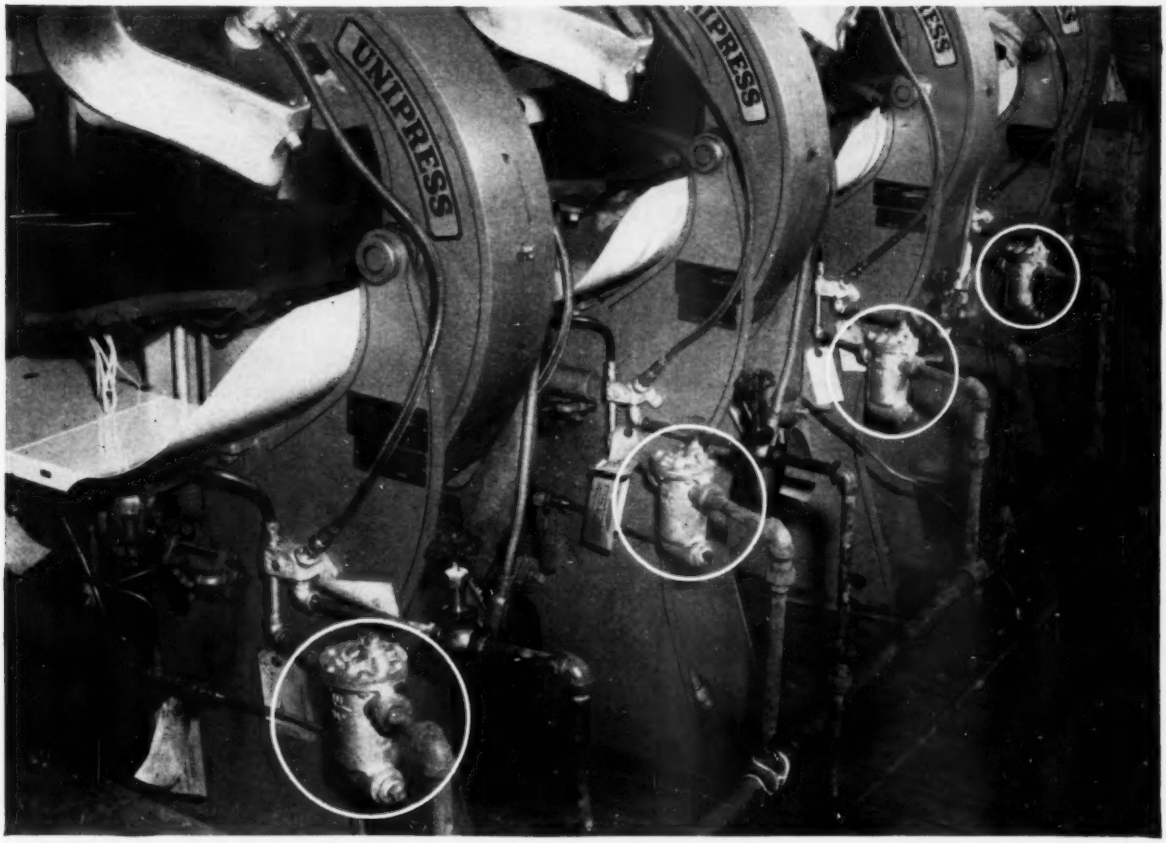
AN INTERESTING booklet is available from the Superintendent of Documents, entitled "Effect of Edge Insulation Upon Temperature and Condensation on Concrete-Slab Floors." This booklet includes a study of the various methods of insulating the edges of concrete floors.

The conclusions drawn from this study point out the amount of insulation, the methods of construction, and the characteristics of the insulation that should be used. It is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price is 20 cents.

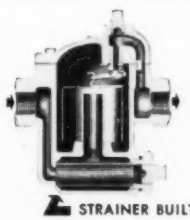
Another booklet may supply the answers on how to cut office expenses and

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

You can't save money by skimping on Steam Traps — An Armstrong Trap *on every unit* always pays dividends



Plant doubles production without appreciable increase in fuel costs



Built-in Strainer Traps save fittings, labor, maintenance. Cost less than separate trap and strainer. Complete data in literature mentioned below.

When Standard Coat, Apron & Linen Service took over a previous linen service plant in Portland, Maine, the boilers could hardly handle the steam load. Mr. Tom Foley, General Mgr. called Files Steam Specialty Company, Armstrong Trap Representative in New England, to help correct the condition.

Under supervision of Mr. Ken Raymond, Chief Engineer, Armstrong traps were installed on *each* unit in the plant.

Results: doubled production with no appreciable increase in fuel consumption; higher machine temperatures; boilers easily handle the load.

This is a typical example of the efficiencies and economies possible through Armstrong unit trapping. Could your plant stand a shot in the arm? Call your Armstrong Representative, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

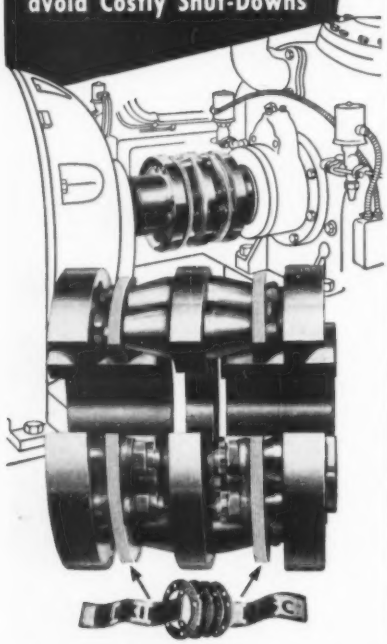
SEND FOR FREE CATALOG

—The "Steam Trap Book" contains 44 pages of trap data—selection, maintenance, trouble-shooting. Free on request. Or Consult Sweets or CEC.

ARMSTRONG STEAM TRAPS

For more facts circle 503 on Reply Card

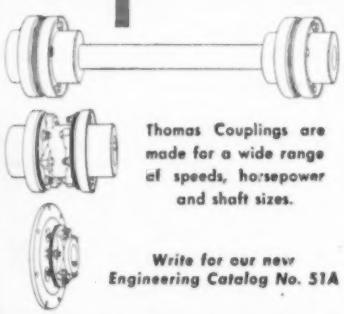
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

boost profits. It gives valuable tips on how to figure what your office costs really are, how to eliminate red tape, keep better records, hire efficient help, etc.

This booklet "Cutting Office Costs in Small Plants," is also available from the Superintendent of Documents, Washington 25, D. C. Price is 25 cents.

Welcome Letter from England

"VERY MANY thanks for the trouble you have taken in obtaining information for me on the manufacture of steel pipes by the 'U'-ing and 'O'-ing process. This is keenly awaited and I know it will prove most helpful.

"My engineering associates who are studying these problems together with me and have knowledge of our correspondence have remarked, and I concur, that such assistance is a true expression of Anglo-American friendship. You are truly entitled to your logo-line 'The magazine that helps plant engineers with their everyday problems.'" *D. Fraser, 79 Londonderry Road, Stockton-on-Tees, County Durham, England.*

Testing Reactor at Your Service

ATOMIC ENERGY Commission is making available to the public on a limited basis the specialized facilities of the Materials Testing Reactor at the National Reactor Testing Station in Idaho.

A part of the reactor space made available to the public on a continuing basis will provide a higher neutron intensity than is available at present in other reactors.

Phillips Petroleum Co., Idaho Falls, Idaho, should be contacted directly for information concerning technical questions relating to irradiation services, scheduling, price lists and arrangements for obtaining these services. Address your inquiry to R. L. Doan, Manager, Atomic Energy Division.

Productive Maintenance Forums

PRODUCTIVE MAINTENANCE forums to help industry get the most productivity from its existing facilities are being planned by the General Electric Co.

The first of the forums, which are being conducted by the company's Apparatus Sales Division in 26 cities throughout the nation, were held in Chicago and Cleveland in early June.

Meetings are designed for plant operating groups, including maintenance, manufacturing, production management and plant engineering personnel.

Program for these forums will include a 25-minute color motion picture, illustrated talks by various experts, exhibits and literature. The film provides a brief review of productive maintenance philosophy and a detailed step-by-step account of the five basic rules which can be followed by industry to increase productivity. In sequence they are: the gathering of complete equipment data; the evaluation of routine maintenance so that cost of equipment will determine how much care is warranted; the establishment of a routine operating control system; an evaluation of critical maintenance; and the establishment of a critical maintenance program.

Vickers New Master Mechanic

Thomas B. Doe, Jr., was appointed master mechanic for Vickers Incorporated, Detroit manufacturer of oil hydraulic power transmission equipment.

In his new position, he will be responsible for process engineering, tooling and allied activities for all Vickers products produced in the company's Detroit, Omaha and Joplin, Missouri, plants.

Plant Engineering Manual

SEVERAL READERS have indicated an interest in establishing a plant engineering manual and would like to hear from other plant engineers who have done something on this.

▶ If your company has prepared such a manual, we would appreciate hearing about it so that this information could be passed on to these men.—*Editors.*

How is Your Industrial Garden?

COMPANIES and institutions that have done an outstanding job in landscaping and beautifying their properties are invited by the American Association of Nurserymen, to enter the 2nd Annual "Plant America" Awards.

The awards (for 1955) will be given in three industrial classifications: manufacturing, service and institutions. Competition will close on September 1, 1954 and the awards will be formally presented shortly after January 1, 1955. Contest rules may be obtained by writing to the American Association of Nurserymen, 635 Southern Bldg., Washington 5, D. C.

Check your Calendar

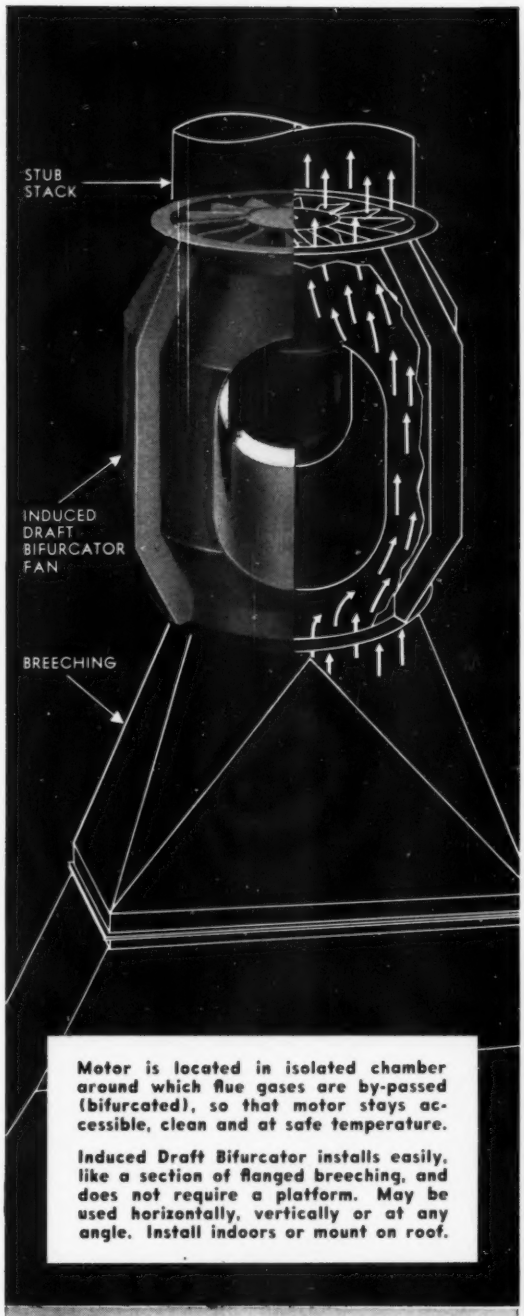
FIRST ANNUAL All-Industry Trade Show, Convention and Symposium of the Industrial Housekeeping Safety Guild, Inc., will be held at the Hotel Ambassador in Atlantic City, New Jersey, from November 6 through 11, 1954. William F. Plowfield is acting as executive director, with headquarters in the Harrison Building, 4 South 15th St., Philadelphia 2, Pa.

Iron and Steel Exposition will be held at the Cleveland Public Auditorium from September 28 through October 1 this year. Additional information is available from Association of Iron and Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.

ELIMINATE TALL STACK...SAVE on COST and MAINTENANCE

BIFURCATOR FAN

provides controlled boiler draft

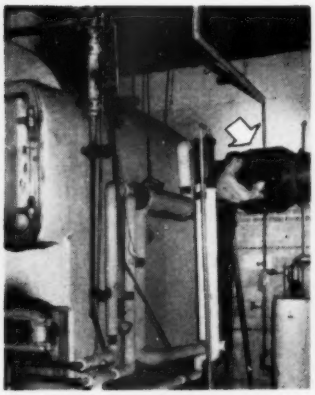


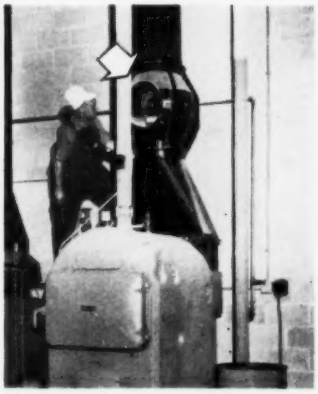
The Induced Draft Bifurcator Fan provides controlled draft for boilers and furnaces under all weather conditions, and yet costs only a fraction as much as a tall stack. An Induced Draft Bifurcator Fan also solves the draft problem when you have no room for a tall stack or object to its unsightly appearance.

Bifurcators provide adequate draft for high-pressure boilers delivering up to 60,000 pounds of steam per hour and for low-pressure boilers rated up to 190,000 EDR. For specifications and construction details, use the handy coupon to request free Bulletin DB-32-53.

Motor is located in isolated chamber around which flue gases are by-passed (bifurcated), so that motor stays accessible, clean and at safe temperature.

Induced Draft Bifurcator installs easily, like a section of flanged breeching, and does not require a platform. May be used horizontally, vertically or at any angle. Install indoors or mount on roof.





DeBothezat Fans

Division of

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

DeBOTHEZAT FANS, DEPT. PE-754
Division of American Machine and Metals, Inc.
East Moline, Illinois

Please send me free Bulletin DB-32-53 containing data on Induced Draft Bifurcators.

FIRM NAME

STREET ADDRESS

CITY ZONE STATE

ATTENTION OF MR.

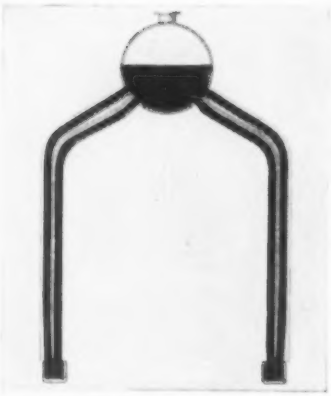
For more facts circle 505 on Reply Card

AN *Exclusive* ERIE CITY DESIGN

The **VL** with EXCLUSIVE features guarantees a minimum of furnace maintenance and insures a positive supply of clean water to the water walls. These EXCLUSIVE features are the result of many years of experience in building two drum boilers; thousands of which are operating in the field today, giving users the satisfactory service they demand.

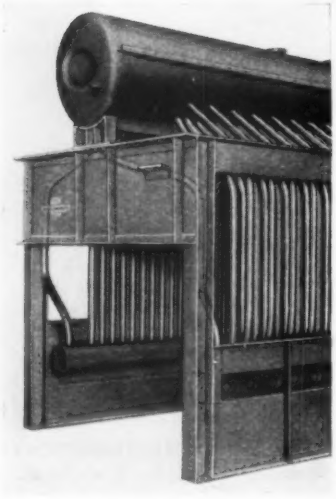
We Pay Royalties to No One for These Designs

COMPARE THESE *Exclusive* FEATURES



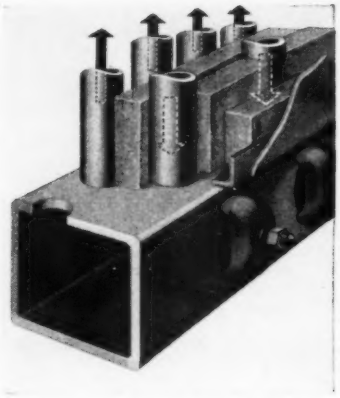
RING-FLOW CIRCULATION IN EACH WATER WALL ELEMENT

For each pair of inside steam tubes, there is a water circulating tube which feeds **clean** water from the top drum to bottom water wall headers. Dividing insulation keeps water circulating tubes cool while heat is carried away from refractory by the steam generating tubes, assuring ring-flow circulation in each element.



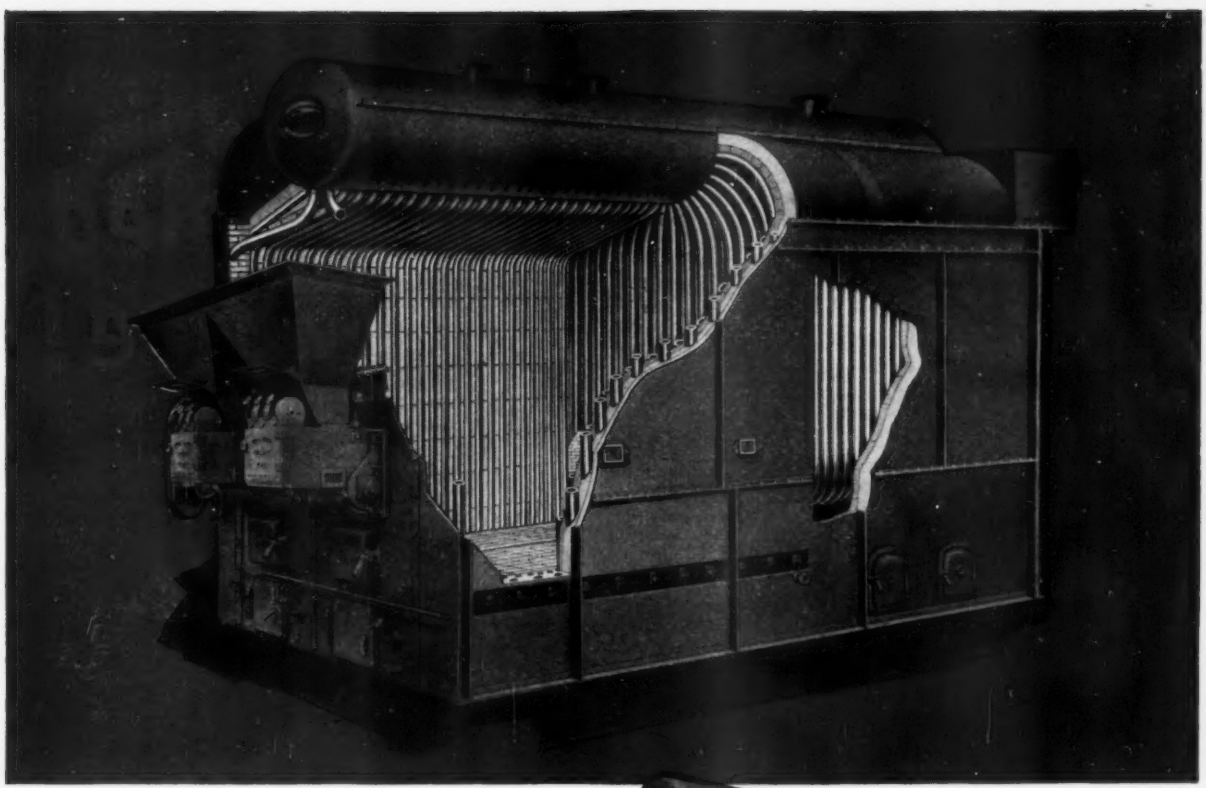
POSITIVE WATER SUPPLY TO WATER WALLS

Normal water level is at the middle of the top drum, but to **assure positive water supply** to bottom headers, under any abnormal conditions, we locate a pair of front feeder tubes at lowest point in the top drum.

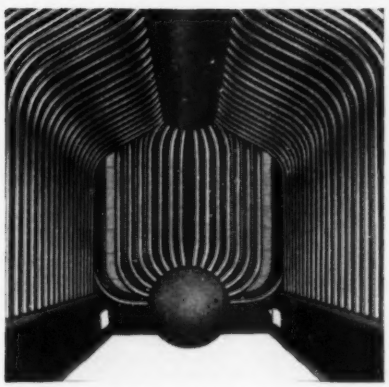


WATER WALLS ACCESSIBLE FROM OUTSIDE THE SETTING

No need to go into the furnace to inspect the water wall headers —VL's are equipped with large handhole openings, **located outside the setting,** for access to any part of the header. No elaborate tools required to remove handhole plates. View above also shows how each downcomer tube supplies a pair of steam or riser tubes in side water wall element.

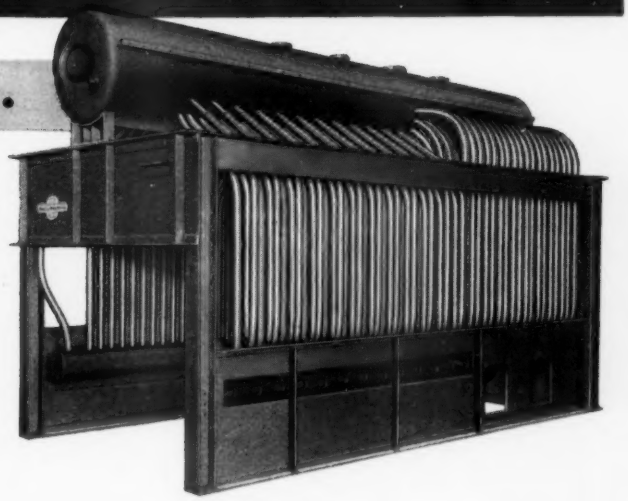


WITH THE FIELD ....



LOW FURNACE ROOF PROTECTS BOILER TUBES

Furnace tubes entering low on the drum **protect drum shell** and top ends of boiler tubes from radiant heat absorption in the event of water low in the gauge.



The VL's integral water wall design with large water and steam capacity combine to make this steam generator universally accepted for its good performance, low maintenance, and ready adaptability to any firing method. Catalog SB-43 gives a detailed description and dimensional data on the Erie City VL Steam Generator.

ERIE CITY
114 Years in Steam Generation

You can depend on Erie City for sound engineering

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS

UNDERFEED AND SPREADER STOKERS • PULVERIZERS

For more facts circle 506 on Reply Card

You've heard a lot about re-rated motors lately. It's a great step forward—and, like other motor makers, Robbins & Myers has re-rated its motors. But regardless of motor size it still pay you to...

Compare the new re-rated motors before you choose!

Before you make up your mind about re-rated motors, let's see what makes them different from the old frame sizes. New electrical concepts? Not at all! The principal difference is size. And engineers have known for years that it takes no special treatment to reduce the size of a motor.

That's why we invite you to compare. You'll see that most of the "new" features you've been reading about lately have been available for years in the Robbins & Myers motor. For instance—grooved end-head openings, re-lubricated bearings, full-height, protective end-rings.

The main reason why R & M motors still lead the field is the construction features shown at the right. These are the things that can make or break a motor when it gets into your plant. And their early adoption by R & M has *consistently* led the industry, as the record shows.

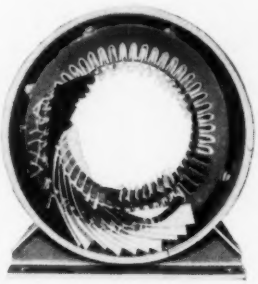
Many of these R & M developments are now in widespread use, of course. That's not a complaint; we're proud of it! But this record of advanced engineering does suggest one thing: *if you want to be sure of getting the latest motor developments, investigate the Robbins & Myers motor.*

Write today for your free copy of bulletin 400 PE. It will give you more details.

This is the new R & M re-rated motor now available from stock in frames 182 and 184. Frames 213 and 215 will be available in early June.

1912—R & M first to adopt pear-shaped slot cells, allowing more room for copper.

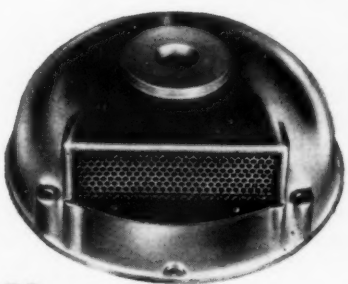
1939—R & M first to make pre-lubricated, sealed ball bearings available on standard integral horsepower motors. Even today R & M gives you the largest bearings for any given shaft diameter!



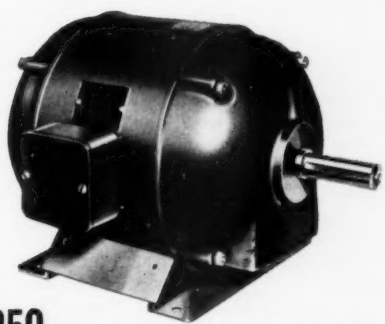
1940—R & M first to insulate between all coil ends, not just phase groups. This gives you 3 to 4 times greater insulating value, and it's still exclusive with R & M.

1944—R & M first to provide cast-iron, full-height end-heads; internal parts are accessible only from below.

Only R&M has given you ALL these features!



1950—R & M first to screen end-head openings at no extra cost. Screened openings keep out debris and rats. (Don't laugh: rodents are a real problem in many places!)



1950—R & M first to introduce a truly "weatherized" motor for industry-wide use, indoors as well as out. All motor parts are protected—inside and out—against moisture and dampness.

If it's an R&M it's the Right Motor!

ROBBINS & MYERS, INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Fractional & Integral h.p. Motors & Generators

Electric Fans

Electric & Hand Hoists & Cranes

Moyno Pumps

Propellair Industrial Ventilating Equipment

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Here's a One-Man Bulk Materials Handling System for Your Plant...

In the Dempster-Dumpster System of bulk materials handling only one man, the driver of the truck-mounted Dempster-Dumpster, is required for operation. The Dempster-Dumpster serves scores of detachable Dempster-Dumpster Containers. Container capacities range up to 4 times that of conventional dump truck bodies and each container is designed to suit the materials to be handled—be they solids, liquids or dust . . . hot or cold . . . bulky, light or heavy. You simply place these containers at convenient materials accumulation points inside or outside buildings. When loaded each container is picked up, hauled and emptied (as shown above) or load set down intact. Entire operation is handled by hydraulic controls in cab.

Containers shown below are just a few of the many available or that can be built to meet your needs. They enable you to handle, at tremendous savings, materials of many descriptions—trash and waste materials, raw materials, finished products, etc. —with only one truck and only one man, the driver.

Without question, the Dempster-Dumpster System is the most economical and most efficient method of plant materials handling by truck ever devised!

Write to us for complete information. Manufactured exclusively by Dempster Brothers, Inc.

One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

DEMPSTER BROTHERS, 174 Shea Bldg., Knoxville 17, Tennessee

For more facts circle 508 on Reply Card

How to solve 39 PRODUCTION PROBLEMS with Mead Air Devices

SEE how to use standard Mead units to make automatic or semi-automatic machines!

New 16-page Mead PHOTO-BOOKLET presents actual examples in pictures and text of 39 different, tough production problems solved by various combinations of Mead Air Operated Devices. This interesting booklet shows how to:

(1) De-burr small parts fast **(2)** Press 3 components together **(3)** Tap die cast knobs **(4)** Insert rubber discs into metal cups for insecticide "bombs" **(5)** Swage hubs to hypodermic needles **(6)** Ream center hole in valve plate **(7)** Broach 2 internal slots in brass valve inserts, handling 4 sizes **(8)** Press filters into copper shells and indent dimple in shell **(9)** Tap 2 holes 6-32 in brass brush holders. **(10)** Drill and tap a 1/4-20 hole 9.16 deep then ream "bell-mouth" in stainless steel forging **(11)** Drill and ream a hole to controlled depth in brass valve body. **(12)** Drill No. 52 hole thru end of solid graphite pencil. **(13)** Press plastic liners into perfume bottle caps **(14)** Drill cast iron gas burners **(15)** Drill 1/4 hole thru steel axle of fishing reel **(16)** Carry copper rods thru series of gas flames to braze special tips to lower ends. **(17)** Chamfer hole in spark-plug bodies approx. 3,600 per hour **(18)** Swage steel ball into brass nose of ballpoint pen approx. 3,600 per hour **(19)** Assemble patented brass couplings and flare neck into nut to simultaneously form fluid-tight seat **(20)** Drill twin holes in chain-saw teeth **(21)** Counter sink both sides small washers, wheels, rollers approx. 4,000 per hour. **(22)** Press shafts, bushings into plastic knobs **(23)** Drill and tap 5-40 threads in rectangular brass electric terminals, approx. 2,400 per hour **(24)** Crimp together 2 thin spring members of pen assembly **(25)** Press brass shells over cast iron cores of doorknob assemblies **(26)** Crimp saddles to plastic radio tube sockets **(27)** Stamp trademark on brass plugs approx. 3,600 to 4,000 per hour **(28)** Press ferrules on wood handles **(29)** Assemble paper hangers' tool roller to yoke by inserting pin thru collar **(30)** Feed, spin finials onto screw of lamp shade holder **(31)** Crimp eyelet and ring on pen barrel **(32)** Drill and tap 2 holes 8-32 in aluminum BX connectors **(33)** Drill 3/16 hole in aluminum part, chamfer both top and bottom of hole, approx. 2,000 per hour **(34)** Cap cathode tubes for TV sets at 3,200 per hour **(35)** Fill pen tubes with ink, insert ball point assembly at one pass **(36)** Bend precut copper tubes 90° at 4,000 per hour **(37)** Drill 2 holes in brass castings, fed to 2-spindle drill head **(38)** Hold plastic bead, drill hole, eject **(39)** Drill bushing for 2 size clevis pins.

MEAD SPECIALTIES COMPANY, Dept. P-74, 4114 No. Knox Ave., Chicago 41, Ill.

TEAR OUT MEMO COUPON FOR YOUR COPY . . .

Memo Coupon

MEAD SPECIALTIES CO.
4114 N. Knox Ave., Dept. P-74, Chicago 41, Ill.

Send new MEAD PHOTO BOOKLET "Air Power At Work" specially printed in green and black.

Name_____

Company_____

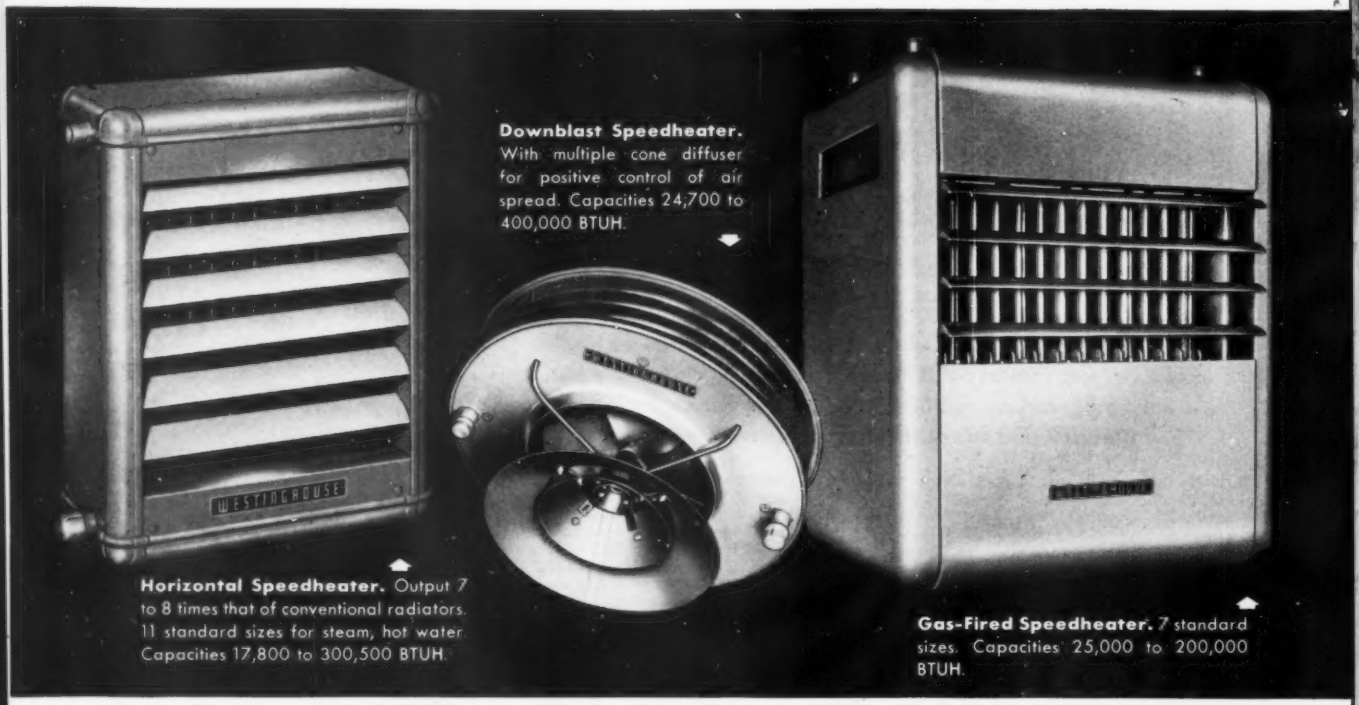
Address_____

City_____ Zone____ State____

For more facts circle 509 on Reply Card

FLOW HEAT EVENLY OVER LARGE AREAS . . .

Westinghouse Speedheaters®



Horizontal Speedheater. Output 7 to 8 times that of conventional radiators. 11 standard sizes for steam, hot water. Capacities 17,800 to 300,500 BTUH.

Downblast Speedheater. With multiple cone diffuser for positive control of air spread. Capacities 24,700 to 400,000 BTUH.

Gas-Fired Speedheater. 7 standard sizes. Capacities 25,000 to 200,000 BTUH.

Outstanding features assure quiet, reliable operation . . . easy installation:

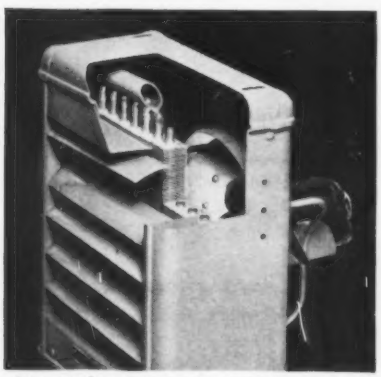
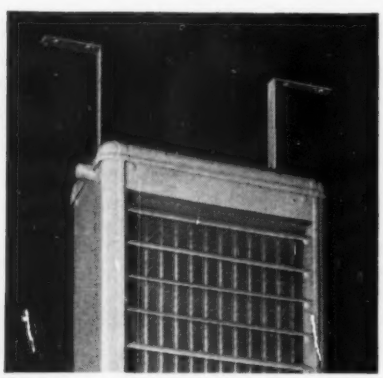
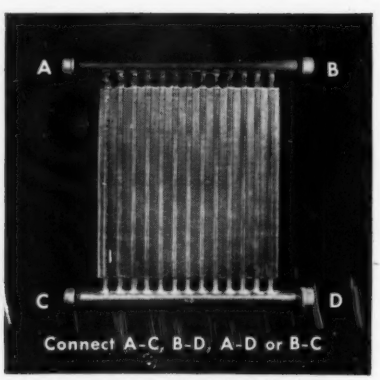


Plate fins cut noise, maintain uniform air flow, minimize clogging of coil with dirt and dust. Adjustable louvers spot or spread heat directly into work zone. Unit requires no warm-up—a flip of a switch generates *instant heat.*



Pliable steel hangers, a Westinghouse exclusive, simplify installation of Horizontal Speedheaters. Heavy-gauge welded steel casings, heavy seamless copper tubes, rugged motor and fan increase service life.



Four connection combinations further simplify installation of Westinghouse Horizontal Speedheaters . . . reduce piping costs . . . allow flexibility in installation to fit varied unit and piping locations.

Spread Instant Heat on Work Zones

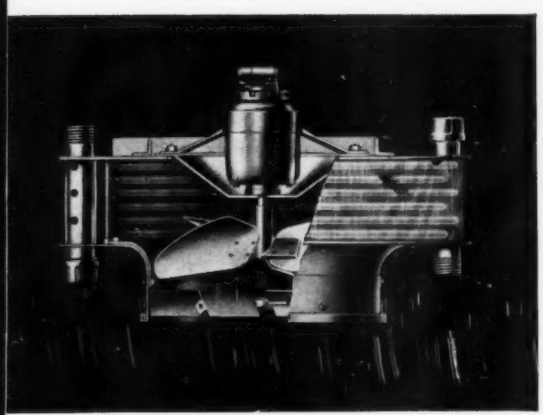
Modern-design Speedheaters slash fuel costs up to 25% when used as complete systems or supplements to existing central systems.

These three Westinghouse Speedheaters provide instant, low-cost heat—*where* and *when* you want it—for applications ranging from spotting heat into small areas, to spreading heat comfortably and efficiently over large work zones. Both dependable and attractive, they are ideal for stores, offices, factories, warehouses—anyplace, in fact, requiring quick, uniform heat at lowest cost.

Westinghouse Speedheaters go to work immediately. Their *instant heat* eliminates fuel loss . . . saves, as proved in installations across the country, up to 25 per cent in fuel costs over old-style heating systems. Available in sizes from 17,800 to 400,000 BTUH, these Speedheaters supplement your present central system for most effective heat coverage . . . or satisfy, through flexible unit selection and placement, your entire heating needs.

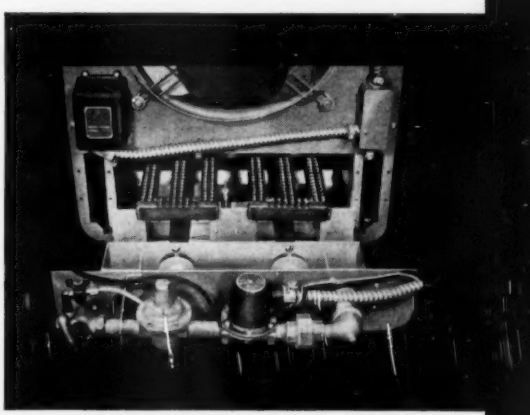
Check on these versatile units today. Call the Westinghouse-Sturtevant representative conveniently located in your area, or write Westinghouse Electric Corporation, Sturtevant Division, Boston 36, Mass.

For specifications, dimensions, performance data, send today for CATALOGS 1521 (Steam—Hot Water) and 1525 (Gas-Fired)



For buildings with high ceilings, Westinghouse Downblast Speedheaters are ideal. Powerful fans and directional vanes project heated air down to work levels, blanketing large areas with effective, economical heat even where equipment and partitions obstruct circulation.

Fully automatic Gas-Fired Speedheaters eliminate need for central heating plants . . . run on low-cost natural, manufactured or LP gas. Units have seal of approval of AGA Testing Laboratories.



WESTINGHOUSE AIR HANDLING

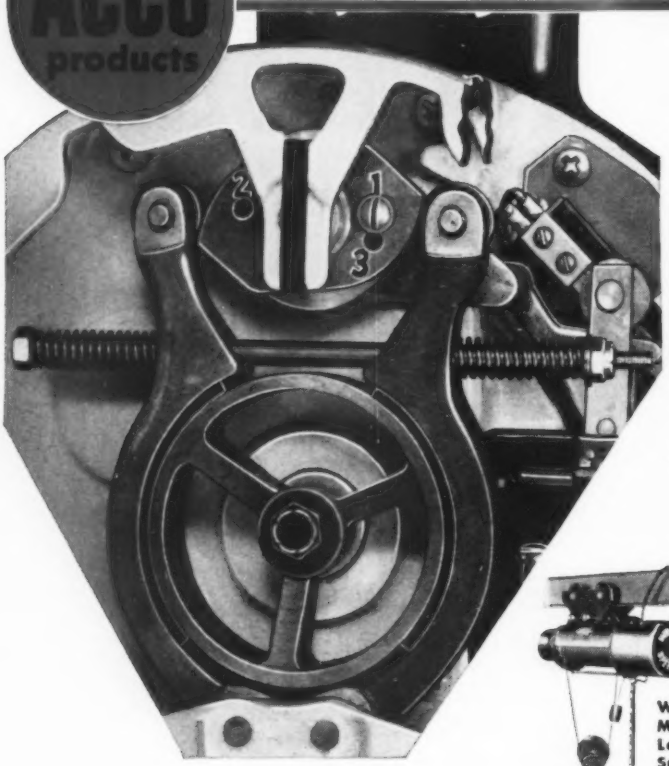
YOU CAN BE SURE...IF IT'S Westinghouse

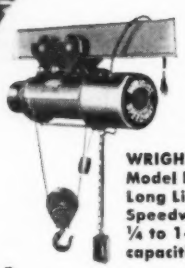
J-80407

For more facts circle 510 on Reply Card

Wright Hoists (1954 Models)

ACCO products





WRIGHT Model L-1 Long Lift Speedway ¼ to 1-ton capacities

Nothing to adjust but the cam!

• The brake assembly pictured above for the WRIGHT FRAME 1 SPEEDWAY HOIST is your assurance of maximum hoist service... minimum down-time. Adjustment of this cam-actuated brake to compensate for brake lining wear is literally "as simple as ABC." *There is no guess work about it.*

When the load hook starts to drift, remove the screw shown at position No. 1 (*see picture*), swing the cam around so that position No. 2 is in line, and replace the screw that secures the cam to the solenoid lever arm. For the final one-third of brake lining wear, set the cam at position No. 3. This repositioning of the cam is the ONLY adjustment to be made by the users of WRIGHT Hoists. The brake springs and solenoid are factory-set... NEVER need adjustment for brake lining wear.

Long life is a built-in characteristic of these hoists. They are built and guaranteed for service to the limit of the duty cycle of 30 minute, totally enclosed NEMA specification motors. These 1954 models provide full accessibility of parts for lowest maintenance costs. To get at the brake and controller, you remove two screws which hold the end cover. To get at the limit switch, transformer, and solenoid coil, you remove three screws and the side cover comes off. With this full accessibility you can make a brake adjustment or replace electrical parts in a matter of minutes.

Remember, PRICE + MAINTENANCE = COST. For full details on the low-cost WRIGHT Frame 1 Hoists see your WRIGHT distributor or write our York, Pa., office for literature.

ACCO

Wright Hoist Division

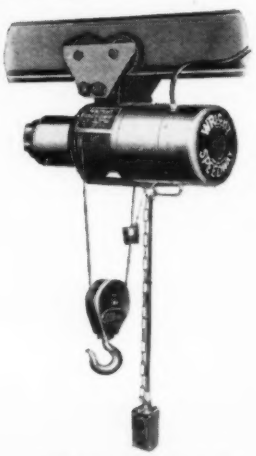
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

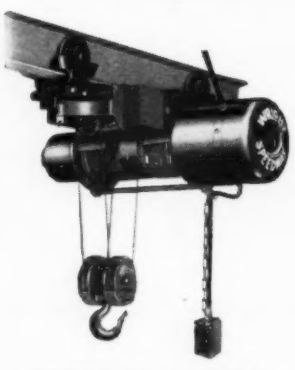
Hoists Trolleys Cranes

IMPORTANT
Maintenance Features

1. **LONG LIFE**
2. **SERVICE ACCESSIBILITY**
   End and side covers quickly removed for complete accessibility of brake, controller, solenoid, limit switch, transformer
3. **SOLENOID ASSEMBLY**
   never needs adjustment, designed to compensate automatically for brake wear
4. **BRAKES**
   require only two pre-determined field settings...no guess work
5. **FRAMES**
   Strong, ductile
6. **GEARS**
   Alloy steel
7. **MOTORS**
   NEMA specifications

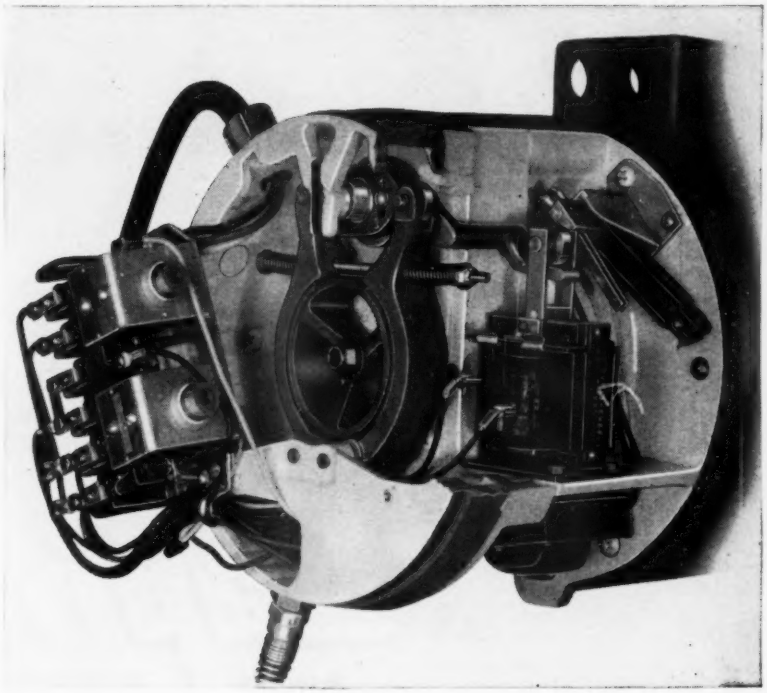


WRIGHT Frame 1 Parallel-mounted Speedway
¼ to 1-ton capacities



WRIGHT Model WH-1 Close Headroom Speedway
¼ to 1-ton capacities

Smash Maintenance Costs!



This partly cut-away illustration (with controller swung out of position) shows the full accessibility of parts provided in the 1954 models of WRIGHT *Frame 1 Speedway Hoists. Note the simple, rugged design of brake and solenoid assembly.*

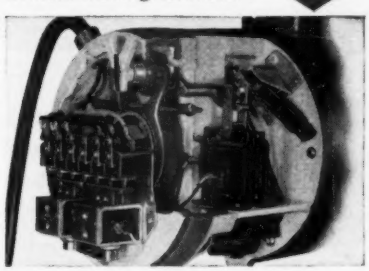
Here's Why Wright Hoists Are Lowest in Maintenance Cost

• The operating heart of an electric hoist is the solenoid-actuated brake assembly. The brake is automatically applied by springs unless the hoist is running. Then the force of the energized solenoid coil overcomes the spring pressure and releases the brake. Here's where trouble begins with ordinary hoists ...keeping the delicate balance between brake spring pressure and solenoid coil pull. But you can't have this trouble with a WRIGHT Frame 1 Hoist because there is no manual adjustment of the solenoid coil...*it's completely automatic!*

And there is no manual adjustment of brake spring tension. Each of the two life-long brake springs has a foolproof setting. The holding nut screws down to a shoulder, and then they're set for the life of the brake lining. Tension in the springs is automatically compensated for by the curvature of the brake cam. This precision cam provides uniform, balanced solenoid pull at *every* stage of brake wear...even after you reset cam at the pre-determined positions for additional brake lining service.

The brake needs adjustment only when the load hook starts to drift. There is *no guess work* in brake adjustment on these 1954 Model WRIGHT Speedway Hoists. It's just a matter of moving one screw into another precisely located hole in the cam. This is due to design of the double-acting brake cam which has three fixed...and numbered (1, 2, 3) ...settings or holes. Factory setting is in hole No. 1. When the load hook starts to drift, lining will be worn so you can reset cam screw in No. 2 position. The next setting of the cam is at No. 3 position. There is *no adjustment of brake springs* and *no adjustment of solenoid coil*. The great possibility of human error is eliminated, so down-time is reduced to an absolute minimum.

Controller back in operating position. Note that brake cam can be reset without moving controller.



The WRIGHT Frame 1 Speedway Hoists were designed to save you maintenance costs. You can prove their full accessibility and low cost maintenance if you place one or more on comparison test in your shop with any other type of hoist. Try a 1954 Model Frame 1. Put it to work. Let it prove itself on your job.

Your WRIGHT HOIST distributor will gladly give you further details. See him at once or write us for information.

REMEMBER: Purchase Price + Maintenance = TOTAL COST

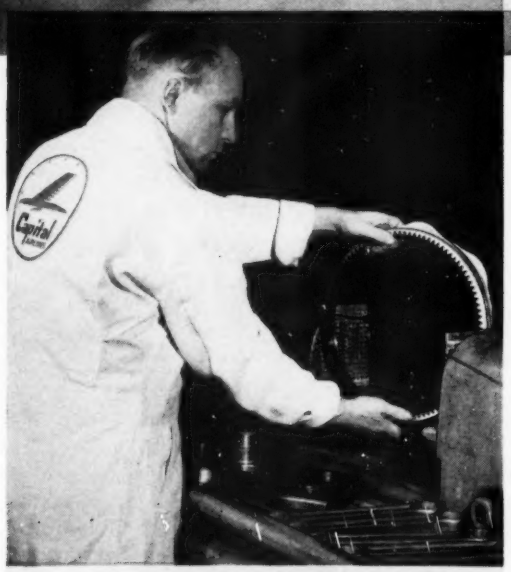
For more facts circle 511 on Reply Card

The outstanding record for safety and reliability that Capital Airlines has established over the years didn't just happen. It is largely the result of mighty good Maintenance—a word that's spelled with a capital M in every Capital office and shop.

Gulf plays an important part in the Maintenance picture at Capital. Gulf quality lubricants keep every one of its scores of machines in good operating condition—prevent excessive wear and help maintain fine adjustments. Gulf quality cutting oils contribute to accuracy and economy in the machining of many different engine parts. And, Gulf Sales Engineers provide year 'round help to Capital people on their shop equipment lubrication and maintenance problems.

Make sure your plant is getting the advantage of all recent developments in petroleum science. Write, wire, or phone your nearest Gulf office today and ask a Gulf Sales Engineer to call.

Capital Airlines is one of the oldest and largest scheduled airlines in the United States. It carries nearly 2½ million passengers a year, flies 84,800 miles a day, and serves 75 major cities from the Atlantic to the Mississippi, and from the Great Lakes to the Gulf of Mexico.



Capital Airlines uses "Magnaflux" inspection to check the steel parts of every engine for flaws. After being magnetized as shown here, each part is immersed in a mixture of a special Gulf oil and minute iron particles. The iron particles attach themselves to any surface defect so that it is quickly visible to the inspector.

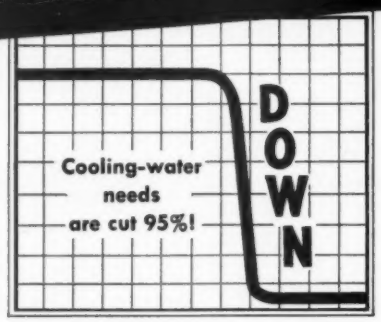
GULF SERVES INDUSTRY

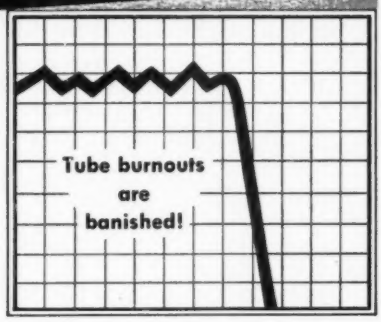
GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building
Pittsburgh 30, Pennsylvania

For more facts circle 512 on Reply Card

Welder Users: SAVE TWICE

by installing G-E TEMPERATURE-CONTROLLED IGNITRONS!





YES, you will make important savings—in cooling water, and in tube replacements. 300,000 gallons of water saved every 8-hour day—$65 at national-average water cost! That's one economy, if your plant has a large number of resistance welders.

Prevent burnouts: that's your second saving with G-E Temperature-controlled Ignitrons. Welding-tube replacements are in three figures. Every burnout you avoid, means one less new tube to buy . . . also prevents a welder outage, with its serious effects on plant production.

Get the performance facts behind these economies! Learn, too, how surfaces of Temperature-controlled Ignitrons are free from "drip" that damages panel components—another plus! Phone your G-E tube distributor today! *Tube Dept., General Electric Company, Schenectady 5, N.Y.*

New GL-6347. Size C. Will replace GL-5552/FG-235-A.

Also available are *new GL-6346,* Size B, will replace GL-5551/FG-271 . . . and *new GL-6348,* Size D, will replace GL-5553/FG-258-A.

* * * *

● 14 G-E ignitrons in all—8 for welding, 6 for power rectification—mean that your tube needs will be closely met, no matter what type or size you are replacing. Superior performance is built into every G-E ignitron, to an extent where the history of the ignitron tube is written in General Electric design improvements . . . latest of these, the new Temperature-controlled Series.

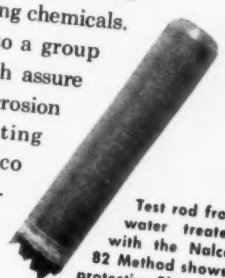
GENERAL ELECTRIC

161-184

For more facts circle 513 on Reply Card

Forest of Facts on Nalco® RECIRCULATING WATER TREATMENT

NALCO Laboratories' continuous research program has gathered this forest of facts about protecting recirculating water systems. In the search for the most effective *and economical* formula, the metal rods shown have been rotated in all types of recirculating waters and treating chemicals. Results pointed the way to a group of Nalco Treatments which assure users against scale and corrosion in virtually any recirculating waters. For details on Nalco Treatment to fit your particular system, call your Nalco Representative, or write direct.



Test rod from water treated with the Nalco 82 Method shows protective film and freedom from any scaling or corrosive attack.

THE Nalco 82 METHOD MAY BE THE ANSWER FOR YOU

The Nalco 82 Method is particularly suitable for scale and corrosion control in recirculating water systems which fall within the characteristic limits given here. Check them to see if your system should have Nalco 82 Treatment:

- Equipment to be protected contains steel and/or brass.
- Hardness of makeup water is more than 50 ppm; and sulphates and chlorides, as sodium salts, are less than 150 ppm.
- Calcium hardness of makeup can be as much as 500 ppm.
- Silica content of makeup water up to 50 ppm.
- Total alkalinity of makeup more than 40 ppm.
- Recirculation rates between 100 and 100,000 g.p.m.
- Where non-toxic waste water is required.

Act today to get the certain, low-cost protection of The Nalco System. Full data on Nalco 82 in free Bulletin 68.

NATIONAL ALUMINATE CORPORATION
6273 West 66th Place • Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

THE Nalco SYSTEM . . . Serving Industry through Practical Applied Science

For more facts circle 514 on Reply Card

"We had a picnic on the boiler room floor"

"When the Chief Engineer recommmended coal-burning boilers for the new plant, one of the directors asked if coal wouldn't make the plant dirty.

"That made the Chief mad! He didn't say anything at the time, but at the first board meeting after the new plant was finished he invited the directors down for lunch.

"You should have seen their eyes! The place was hospital clean. And why not? The coal came into the stoker through dust-tight chutes, and the ashes were piped out through pneumatic tubes.

"While the directors were eating, the Chief gave them a chalk-talk. On one side of the blackboard he had charted the savings through the use of of coal as compared with other fuels. On the other side he had a comparison of our proven reserves of the various fuels showing that while other fuels are growing scarcer, we have barely scratched the surface of our almost inexhaustible coal deposits."

COAL
FUEL OF THE FUTURE

Chesapeake and Ohio Railway

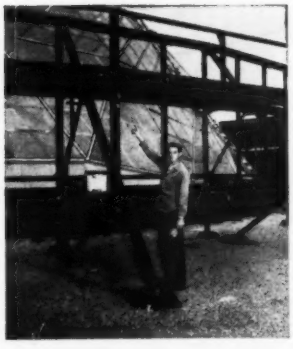
Bring your fuel problems to C&O

As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

Write to:
Coal Traffic Department
Chesapeake and Ohio Railway
2111 Terminal Tower
Cleveland 1, Ohio

For more facts circle 515 on Reply Card

PITT CHEM licks weather at Ford Rotunda



When the Ford Motor Company remodeled the well-known Ford Rotunda for its 50th Anniversary exhibits last year, protection of new steel dome supports against year-round exposure to weather and industrial atmosphere was a high priority project. Ford maintenance engineers specified Pitt Chem Tar Base Coatings. You'll discover, too, that no other material does such a complete, economical job of protection.

Pitt Chem Coatings are formulated from coal tar pitch for one and just one purpose—to *stop corrosion*. They're tough. They're durable. And their applied film is up to ten times as thick as ordinary paint. What's more, you don't need special equipment or a degree in engineering to apply them.

If that sounds like the kind of a hard-working, never-say-Uncle protective coating you've been looking for, let's have your maintenance experts and ours make contact. A survey will cost nothing. A letter or phone call will get it started.

W&D 4957

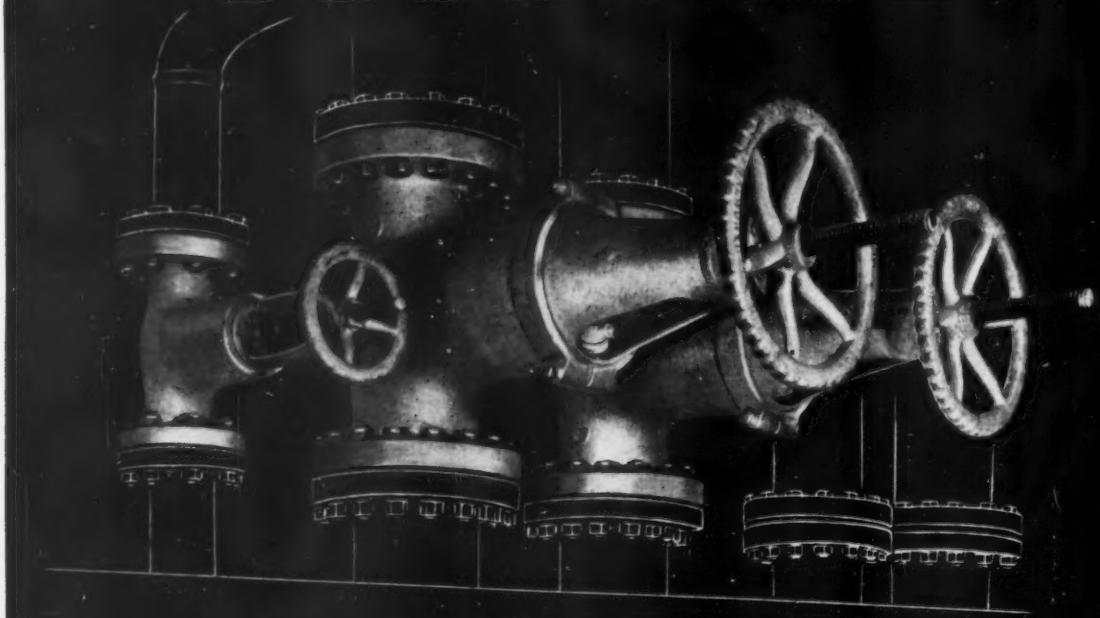
PITT CHEM 101—For Severest Conditions
PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Compound
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Specialty Coating

PROTECTIVE COATINGS DIVISION
PITTSBURGH
COKE & CHEMICAL CO.
Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

For more facts circle 516 on Reply Card

WALWORTH

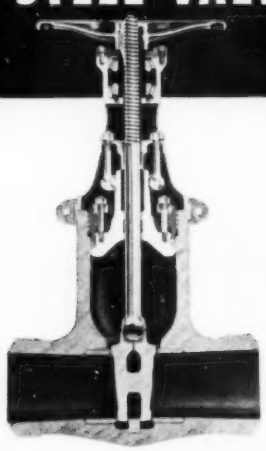


PRESSURE-SEAL CAST STEEL VALVES

Better because ... **They have no bonnet flanges, bonnet bolts, or bonnet welds. Ideal for high-pressure, high-temperature steam service and corresponding boiler feed service, Walworth Pressure-Seal Cast Steel Valves weigh less, and take up less space than the flanged bonnet type of valves used for similar services.**

These are a few of the important advantages made possible by the design of Walworth *Pressure-Seal* Cast Steel Valves. Internal line pressure is utilized within the bonnet to maintain a tight, leakproof, body-to-bonnet connection under all normal operating conditions. The higher the pressure, the tighter the seal.

Ask for your copy of Walworth Circular 143. It gives detailed information, including sizes, dimensions, and specifications for all Walworth Pressure-Seal Cast Steel Valves.



Cross section of 8-inch Series 900 Walworth Pressure-Seal Cast Steel Gate Valve. Pressure-Seal Globe, Check, Angle, and Non-Return Valves are also available in Series 600, 900, 1500 and 2500 in a wide range of sizes.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For more facts circle 517 on Reply Card

Rome RoZone-RoPrene power cable is top quality, protects against acids, alkalies, oils, greases, moisture, heat, sunlight and flame. Its Neoprene sheath permits direct burial in earth, where desired.

Wherever your plant equipment is subjected to *extreme* heat, moisture or corrosive conditions, specify Rome Synthinol® 901. This special polyvinyl chloride insulation provides excellent protection for most applications through 600 volts.

Before you install another foot of cable ...ask yourself these questions:

1. What cable do we need to handle our expanding load?

2. How can we be sure of trouble-free cable performance?

Shutdowns or production interruptions, caused by failing or inadequate power cables, can be very costly.

So here are some pointers on the questions above:

1. Compare the present electrical load with that for which your power feed system was originally designed.

Then call in your utility man, electrical contractor, or nearest Rome Cable sales engineer. All of them are trained to help your own engineers survey the present and future needs of your plant.

2. Take every step to assure lasting value in the cable you install. Guard against ionization—the electrical breakdown of air in pockets within the insulation, or especially where it has not been firmly bonded to the conductor surface or shield.

Ionization may cause such electrical effects as ozone cutting, reduced dielectric strength, or increased dielectric loss. They can all lead to premature cable failure or reduce the efficient performance life of the cable.

To assure maximum performance, specify Rome products. Every foot of Rome cable rated at 3000 volts and over is tested for ionization before shipment—just *one of many checks* to make sure the Rome cable you install will stand up now, and in the future.

For complete information about these extra-quality Rome products just return the request slip below.

It costs less to buy the best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE CORPORATION, Dept. PE-7, Rome, N. Y.

Please send me items checked: ☐ Literature on Ionization,
☐ Rome Power and Control Cable Catalog,
☐ Rome Synthinol Bulletin.

Name ..... *Title* .....

Firm .....

Address .....

City ..... *Zone* ..... *State* .....

For more facts circle 518 on Reply Card

Notice the

CONCAVE SIDES

(U.S. PATENT NO. 1813698)

of **Gates V-Belts!**

--that's why they last longer!

Just try this yourself. Bend any *straight-sided* V-belt (Fig. 1) as it bends in going around its pulley. At the same time, grip its sides with your fingers and *feel* those sides *bulge out!* (Fig. 1-A)

Clearly, those bulging sides are forced to press *unevenly* against the V-pulley—and this causes extra wear at the points shown by arrows (Fig. 1-A).

Now bend the Belt with CONCAVE SIDES . . . . . the GATES VULCO ROPE (Fig. 2)

You will feel the precisely engineered CONCAVE SIDES *fill out* to an *exact fit* in the sheave groove (Fig. 2-A). These sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the full width of the GATES VULCO ROPE—and this means *longer* belt life and *lower* belt costs for you.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!

Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

VULCO ROPE

Gates **DRIVES**

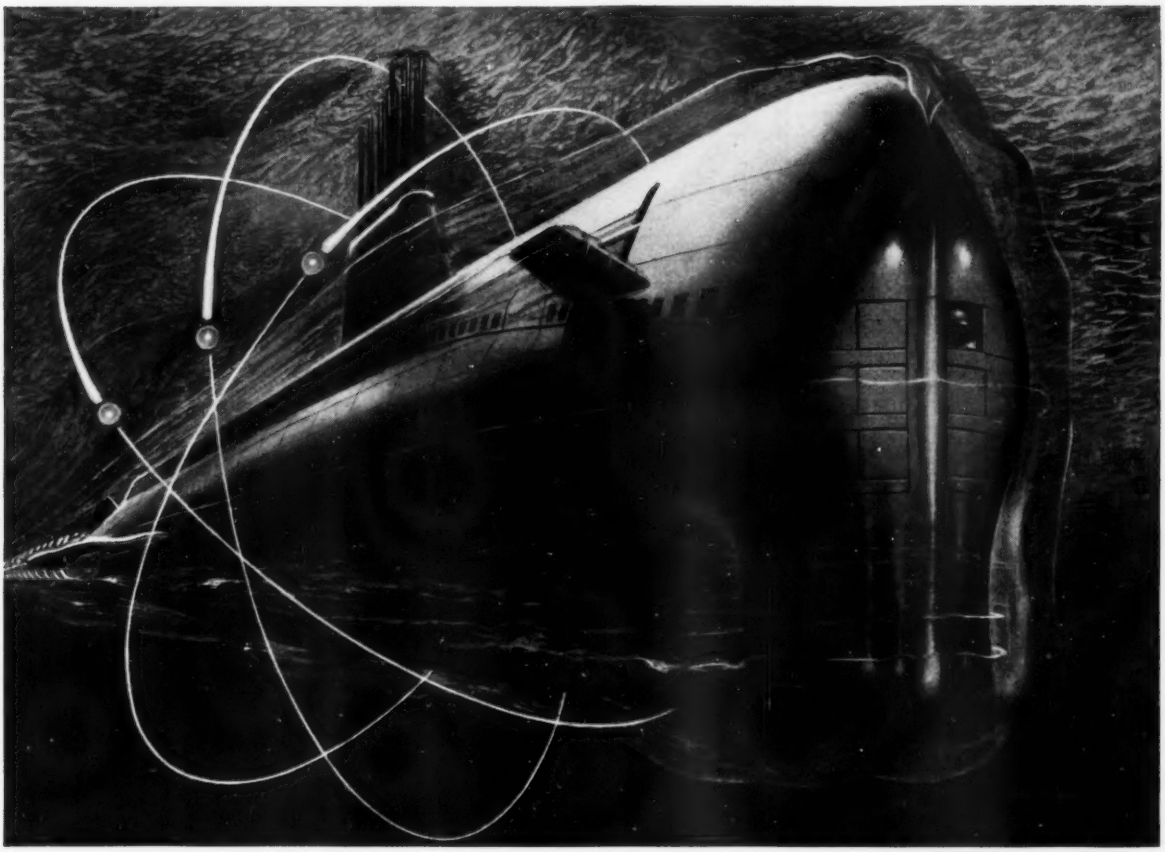
THE GATES RUBBER COMPANY

DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

CO-342

For more facts circle 519 on Reply Card



ATOMIC SUB BUILDERS

Rely on World's Greatest Lubrication Knowledge and Engineering Service

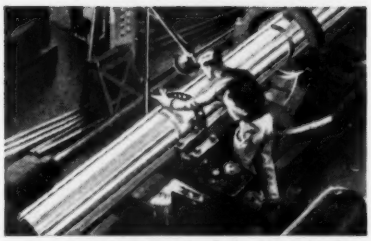
AFTER 54 years of building over 300 "conventional" submarines for the U. S. Navy and our allies, Electric Boat Division, General Dynamics Corp., marks its entry into the atomic age with the launching of the "Nautilus"—world's first atomic powered submarine.

Electric Boat, with its sprawling foundries and shops along the Thames River at Groton, Conn., is really many industries in one. It casts its own metals—both ferrous and non-ferrous. It shapes and machines metal parts—from thick armor plate to parts with microscopic tolerances. It has 27 overhead cranes, marine railway and land railroads, a fleet of trucks, low- and high-pressure compressors, its own Diesel power plant.

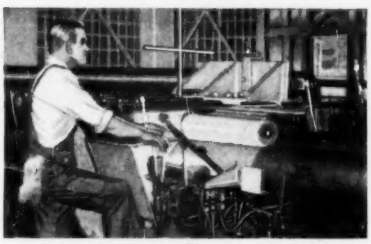
This wide variety of costly machinery represents almost every lubrication condition found in modern industry. That is why Electric Boat relies 100% on Gargoyle lubricants and a program of Correct Lubrication—has done so for 34 years.

★ ★ ★

You can give your plant, mine or mill this same unsurpassed protection. Just call your Socony-Vacuum representative.



A snorkel intake tube being machined to very precise tolerances on one of the large lathes in the Groton plant.



Hydraulic bender shapes section of 8-in. steel pipe in two minutes. This operation formerly took a full day.

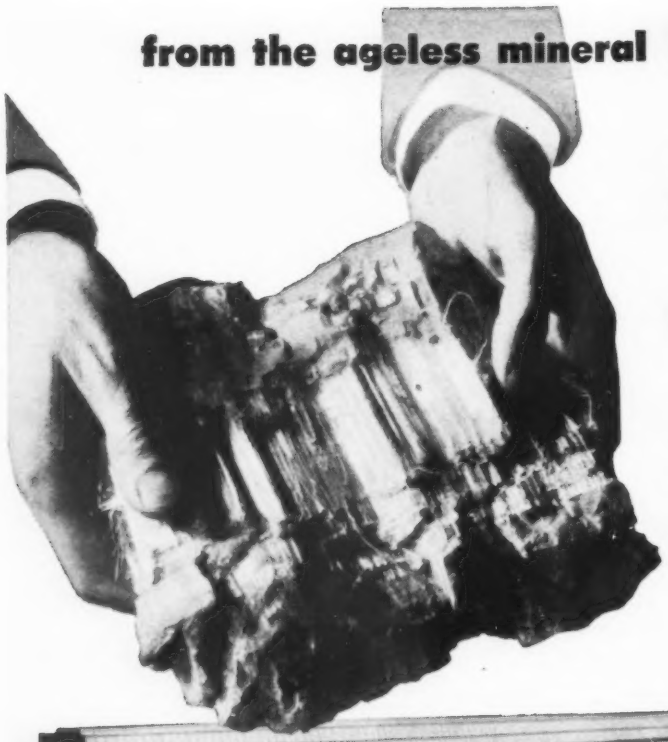
SOCONY-VACUUM *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

For more facts circle 520 on Reply Card

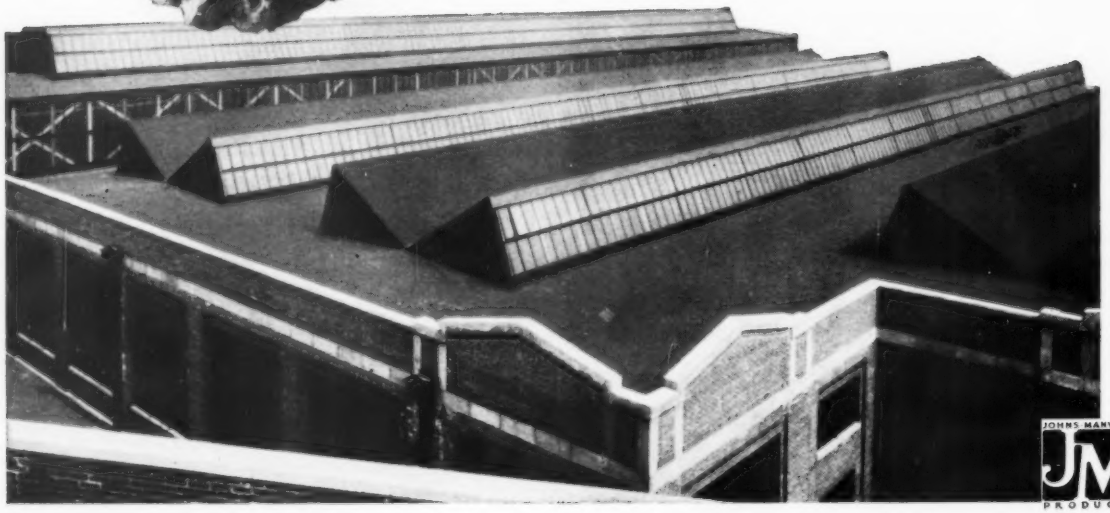
from the ageless mineral **ASBESTOS**



...comes the smooth-surfaced built-up roof

FLEXSTONE*

which provides a flexible covering of stone...



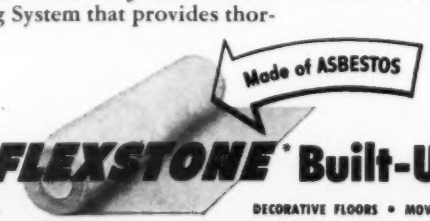
JOHNS MANVILLE JM PRODUCTS

Because they are made of the mineral, asbestos, the felts of a Johns-Manville Flexstone Built-Up Roof assure lasting service and protection. They will not support combustion. They effectively resist the drying-out action of the sun . . . won't rot, are weatherproof and need no periodic coating.

Flexstone Built-Up Roofs are smooth-surfaced . . . permit thorough drainage . . . make damage easy to locate and repair. These superior advantages are also provided by the J-M Flexstone Special Built-Up Roof . . . developed especially for dead-level decks.

For complete information about Flexstone Roofs and J-M Asbestile* Flashing System that provides thorough water tightness and effective treatment for critical roof areas, see your Approved Johns-Manville Contractor. He's listed in the Classified Section of the telephone directory. Or send for folder BU-51A. Write Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ont.

*Reg. U. S. Pat. Off.

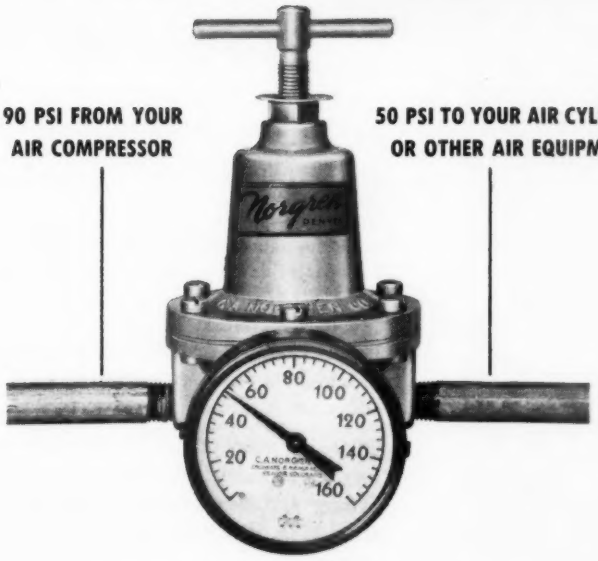


Johns-Manville FLEXSTONE* Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS DECORATIVE FLOORS • MOVABLE WALLS • ETC.

For more facts circle 521 on Reply Card

Why waste compressed air at 90 psi where 50 psi *will do a better job ?...*



...and

- ***reduce wear on air equipment***
- ***save dollars on air costs***

USE NORGREN PRESSURE REGULATORS

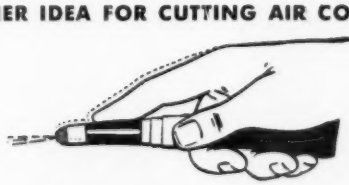
Norgren Regulators more than pay for themselves in savings in air costs alone. More important—they accurately control air pressures to assure proper operation of equipment and minimum maintenance costs. Available in wide range of remote control, low pressure, relieving and cylinder gas types.

WRITE FOR NEW CATALOG No. 600

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

ANOTHER IDEA FOR CUTTING AIR COSTS



A blow gun with 90 psi line pressure uses 10½ cfm of air. 30 psi usually does the job just as well and uses only 4½ cfm . . . saving 6 cfm every minute—on one gun used an average of one hour per day the saving would be 90,000 cu. ft. of air per year.

VALVES • FILTERS • REGULATORS • LUBRICATORS • HOSE ASSEMBLIES

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SARCO electric temperature control

ACCURACY AND SENSITIVITY BY SIMPLE ELECTRICAL MEANS

"Very successful in our operation, and I specify them on all our new equipment," says Thomas Allison, Plant Engineer of Southern Gravure Service, Louisville, Ky. ***(See photo at left)***

IN HIS CASE the operation is plating, an industry in which SARCO electric controls have found wide adoption.

There are many others: For example, dryers in the textile, tanning, food and chemical industries; dyeing and wet finishing processes in textiles; processing, distilling and evaporating in chemical plants.

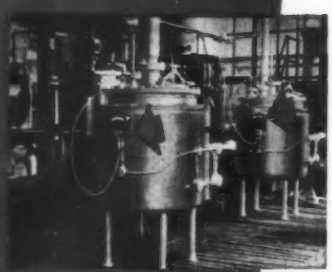
SARCO's complete line includes also thermostats and solenoid or motor valves for space heating, air conditioning and refrigeration control.

Get the whole story by writing for bulletins 1025 and 1080.

SARCO COMPANY, INC.
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.
SARCO CANADA LTD., TORONTO 8, ONTARIO
REPRESENTED IN PRINCIPAL CITIES

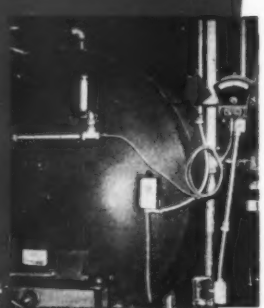
PLATING

In copper and chromium plating of rotogravure rolls, the temperature of plating solutions is held to within ½°F by Sarco Electric Indicating Temperature Controllers. Photo taken in Southern Gravure Service plant, Louisville, Ky.



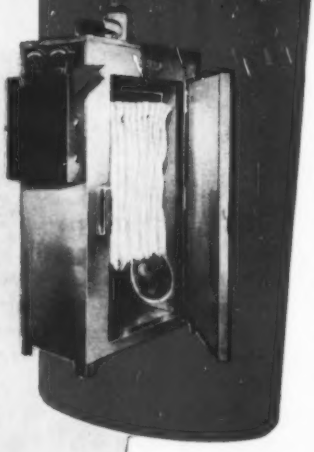
CHEMICAL

Hoffman La Roche Pharmaceutical Co., Nutley, N. J.—the jacket water temperature of these stills must be held to within ½°F. For the past 9 years, Sarco LSI Indicating Temperature Controllers have been doing that job.



FOOD

Chocolate milk and soft drinks in bottles and cans are processed in Fort Wayne Sterilizers. Many users equip these Sterilizers with Sarco LSI Electric Indicating Controllers to hold the temperature to within ½°F. Hook-up sketches and case histories on request.



TEXTILE

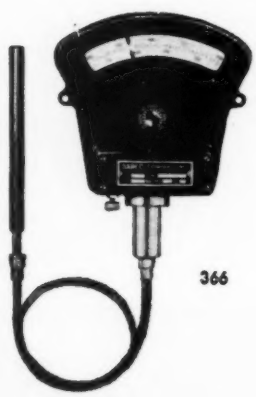
The Backus Hosiery Conditioner processes 15 denier nylon hosiery—40 dozen per 1 hour cycle. The humidity and dry heat are controlled by two Sarco Electric Indicating Temperature Controllers. Over 500 LSI's have been factory-installed on these Conditioners by Backus Machine Works, Carlstadt, N. J.

TYPE LSI •

An extremely sensitive and accurate Electric Indicating Temperature Controller for temperatures from minus 90°F to plus 650°F. Controls electric heating elements, motors, solenoid or motor valves to maintain constant temperature.

A built-in thermometer makes setting easy and provides a continuous check on temperatures maintained without the bother of continually changing charts.

A double switch type L2SI is available for alternate heating and cooling control, or step control of heating or cooling.



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For more facts circle 523 on Reply Card

BULLETINS just released and of immediate plant interest

INSTRUMENTS, CONTROLS

101 Recording, Controlling Instruments—Circular M-2-A, 48 pp, illustrates, discusses manufacturer's entire line of mechanical industrial instruments, including fixed stem and distant reading dial thermometers, temperature and pressure recorders, controllers, diaphragm motor valves. A complete listing of 9-, 10- and 12-in. circular recorder charts is also available. Weston Electrical Instrument Corp.

102 Controls for Liquids, Gases—Bulletin 004, 36 pp, is a revised edition of company's general catalog on measuring and control equipment. This practical book contains information on many types of controllers, gages, manometers, recorders, meters, valves, venturi tubes, etc., for power and processing industries, others. ing. Simplex Valve & Meter Co.

103 Control Center Installation—Bulletin F 5265-1, 8 pp, tells how to improve the installation of controls for heating, ventilating and air conditioning with company's automatic electric control center system and electric automatic controls. Points out benefits from centralized system. Compares other method of preparing electric control layouts with simplified wiring diagram. Barber-Colman Co.

104 Flow Meters—Catalog 2320, 58 pp, fully illustrated, describes all types of manufacturer's flow meters, including indicating, recording, integrating and controlling instruments of evenly graduated and square root types, as well as area meters and differential converters. Includes tables on flow approximations, installation information, factors necessary to determine if fluid to be measured can be properly handled. Industrial Div., Minneapolis-Honeywell Regulator Co.

105 Industrial Thermometers—Fourteen-pp Catalog 101 describes and pictures company's Gotham line of thermometers, including the Multi-Angle which can be rotated and tilted to practically any position. Includes temperature equivalent table. U. S. Gauge Div., American Machine and Metals, Inc.

106 Electrodes, Electrode Assemblies—Catalog EN-S5, 20 pp, describes electrode assemblies for measurement, recording, and/or control of solution pH and redox potentials. Covers manufacturer's electrode line, chemicals for servicing, auxiliary equipment including clamps, holders, thermometers. Leeds & Northrup Co.

107 Process Timer—Eight-pp Bulletin GEC-1223 describes in detail the operation, advantages, and applications of company's new type process timer. Also includes correction diagrams for typical applications, as well as installation pictures, prices. General Electric Co.

108 Water Gages—Recent improvements made in this company's flat-glass high pressure water gages are described in 20-pp Catalog WG-1812 covering boiler water columns and gages. It provides details on the round-glass gages for pressures up to 400 psi and the flat-glass gages featuring separated-design, floating assembly and inserts and Type M illuminators for pressures to 2500 psi. Yarnall-Waring Co.

109 Boiler Water Level Controls—Catalog SC-5, 24 pp, is a revised edition of manufacturer's catalog of boiler water level controls and safety devices. Includes boiler feeders, low water cut-offs, pump controllers and relief valves, also special adaptations and components. Contains engineering information, including capacity curves and roughing-in dimensions, with parallel data on the different models tabulated for quick comparisons. Includes price sheet. McDonnell & Miller, Inc.

110 Instruments for Steam Generation—Bulletin 9050, 32 pp, is a handy reference for all manufacturer's products applicable to steam generation, including electric, pneumatic, electronic and mechanical types of instruments and controls. Plant engineers will find it useful in selecting instrumentation for modernization of package boilers. Industrial Div., Minneapolis-Honeywell Regulator Co.

111 Electronic Computers—This 12-pp illustrated brochure describes a line of electronic computers and plug-in components, including such recent developments as mach computers, master air data computers, accelerometers, positioning mechanisms. It also provides a brief summary of the company's history, facilities and services. Servomechanisms, Inc.

ELECTRICAL EQUIPMENT

112 Motor Selection Aid—Bulletin B-2102, a 12-pp "motor selector" is designed to help plant engineers choose squirrel cage induction motors from among manufacturer's new and current lines, for applications from 1 to 200 hp. Lists performance characteristics, construction features, dimensions, prices. The Reliance Electric and Engineering Co.

113 Control Motors—This 24-pp catalog presents three major types of fph motors: low inertia servo motors for extremely sensitive servo systems; conventional (medium inertia) servo motors; and synchronous motors. Fully illustrated, booklet provides engineering data on each type, and includes specifications. Ford Instrument Co., Div., The Sperry Corp.

114 Motor Starters—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type ZHS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

115 Electrical Connections—Form 2759, 8 pp, catalogs manufacturer's Turnlok line. Sturdy construction, easy wiring, positive contacts, safety and other features of the line are stressed. Receptacles, connectors, caps are pictured and described. Pass & Seymour, Inc.

116 Wire-Wound Components—Catalog R-200, a 36-pp guide to manufacturer's electronic components, describes subminiature resistors, precision and power resistors, IF and RF transformers and coils. Tables and charts give specifications. I-T-E Circiut Breaker Co.

117 Distribution Transformers—How to distribute secondary loads and temporary overloads with Type ACPB transformer is told in Bulletin 61B8054. Shows how secondary banking improves service; describes basic construction of transformers, their operation and installation. Allis-Chalmers Mfg. Co.

118 Dry-Type Transformers—Catalog H-10-101, 16 pp, describes four groups of manufacturer's dry-type air-cooled transformers (0.1 to 300 kva), each available in auto type or double wound, with standard light and power in each case. Contains descriptive information, diagrams of dimensions, schematic diagrams, specification charts. Harrison Transformer Corp.

119 Outdoor Metering—Booklet B-5916 describes outdoor metering outfits (Type MP) in three-phase from 2.4 to 115 kv, single-phase from 15 to 161 kv. Points out Type MP combines potential and current transformers in one tank. Cites advantages of easily removed bushings, low insulation power factor, other features. Westinghouse Electric Corp.

120 Panel Instruments—Bulletin GEC-368F, 12 pp, illustrated, describes, gives construction and application information on company's line of a-c and d-c panel instruments. Includes dimensions, prices, physical, operational and electrical data. General Electric Co.

121 Electric Power Drives—Application Tabloid Bulletin 185, 8 pp, presents 60 photos of manufacturer's electric power drives on various types of machinery and equipment. Includes application stories from metal, chemical, petroleum, plastic industries, heating and ventilating uses. Sterling Electric Motors, Inc.

MECHANICAL POWER TRANSMISSION

122 Packaged Speed Variators—Twenty-pp Bulletin GEA-6127 describes a line of packaged speed variator drives from 1 to 200 hp. Explains and illustrates the operation and application of the basic speed variator and additional features available. Special attention is given the lumber, machine tool, textile and steel industries, as well as to use of speed variators in materials handling. General Electric Co.

123 Manual on Speed Reducers—Engineering Catalog 100 presents manufacturer's line of herringbone gear speed reducers rated in accordance with AGMA standard practice. Arranged for easy reference, this practical 160-pp book shows types and styles available, gives general advantages of the line and makes it easy to choose the proper drive for the job. Quick selection tables, suggestions on selection procedure, and selection examples are provided, along with ratings, dimensions, assembly diagrams and weights. Photos show these reducers in use in the steel, cement, paper and other industries, and in materials handling and other applications. Book is available to qualified plant engineers, please state your job title. W. A. Jones Foundry & Machine Co.

124 Data on V-Belts—Bulletin S-5132, 32 pp, contains engineering and design data on multiple v-belts to help anyone with an ordinary mathematical background solve problems of selection, installation and service where these belts are used for power transmission. Includes recently approved hp ratings by Rubber Mfrs. Assn and others. Gives standard sizes, pitch lengths of v-belts, groove dimensions for their sheaves. Goodyear Tire & Rubber Co.

125 Sprockets, Couplings—Up-to-date information on Gripmaster sprockets, flexible couplings and steel "weld-on" hubs is given in 16-pp Bulletin 184. Providing photos, sizes, price lists and instruction data, the booklet also includes sections on uses, advantages, flexibility of an interchangeable bushing system. Cullman Wheel Co.

126 Improved Hose Coupling—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Bulletin also describes single- and double-check valve modifications which permit disconnecting lines without shutting down pumps; and act to prevent escape of valuable or hazardous fluids when the lines are opened. Titeflex, Inc.

127 Convoluted Couplings—Catalog 55, 16-pp, introduces Sola-Flex convoluted couplings engineered to meet industrial needs for low pressure and vacuum service joints. Gives full engineering data, with spring rates, deflection forces and dimensions. Provides tables giving data on each size and type of coupling, along with dimensional diagrams and formulas for calculating movements of couplings. Bellows Div., Solar Aircraft Co.

You'll find two postage-free Reader Service Cards on pages 171-172. Use them for ordering these bulletins—just circle the item numbers of those you want. You may also use the cards for requesting advertised catalogs.

128 **Quick Couplings**—Eight-pp Bulletin 54-1 describes Pushomatic quick couplings for air, hydraulic, or fluid handling applications. Illustrated with photos and dimensional drawings, bulletin explains quick connection, no leakage, compactness, safety and other advantages. Breeo Mfg. Co., Inc.

129 **Reusable Coupling**—Bulletin 105 describes, gives dimensions on a two-piece reusable hydraulic hose coupling with Interlock grip for one-wire braid cotton cover hose. Shows how to make up hose assemblies, gives installation photos and instructions. Eastman Mfg. Co.

BOILERS, ACCESSORIES

130 **Small Boilers**—Bulletin AD-134, illustrated, introduces manufacturer's "CB" line of small boilers in 15 to 40 hp (15 to 150 lb steam, 30 lb hot water) for heating and processing. Discusses advantages of silent operation, fuel economy, electric combustion safety control. Includes drawings, specifications on four models. Cleaver-Brooks Co.

131 **Continuous Blowoff Equipment**—Bulletin 2391A, 12 pp, tells how manufacturer's automatic continuous blowoff equipment meets need of modern boilers for fuel economy, less blowoff and strain on metal, elimination of foaming and priming. Illustrates typical arrangements, examples. The Permutit Co.

132 **Boiler Gaskets**—Bulletin AG-953, 12 pp, shows manufacturer's Ajax spiral wound gaskets for pipe flanges, boiler manholes and accessories, special processing vessels. Includes easy-reference flange and boiler gasket dimension tables, bolting data. United States Gasket Co.

TURBINES

133 **Turbine Speed Control**—Thirty-pp wire-bound Bulletin H-21 is titled, "Fundamentals of Turbine Speed Control." It is an elaborately illustrated, educational booklet intended to clarify the operation of common types of automatic speed control for steam turbines. An introductory section covers general fundamentals of automatic control systems, and includes a key to control terminology. Simplified diagrams show operating principles. Elliott Co.

134 **Mechanical Drive Turbine**—Bulletin H-22, 16 pp, shows design features, proper control of manufacturer's Type YR mechanical drive turbine. Lists modifications for special applications, dimensions. Elliott Co.

PROCESSING EQUIPMENT

138 **For Liquid Processing**—This 32-pp catalog contains photos and comprehensive information on manufacturer's line of stainless steel liquid processing equipment, including filters, filter disks, mixing and storage tanks, portable mixers, agitators and transfer pumps. Each product is treated separately and its features described. Book also provides numerous plant installation illustrations, design variations, detail drawings and parts list, application and performance data. The Alsop Engineering Corp.

139 **For High Temp Applications**—Bulletin GS 101 describes Graph-i-tite, a basic construction material for chemical processing and metallurgical applications. Tells how Graph-i-tite withstands attack of most chemicals and operating temperature to 5700 F. Graphite Specialties Corp.

140 **Chemical Porcelain**—Bulletin 438, 24 pp, catalogs company's line of chemical porcelain equipment for process applications, including Y and angle valves, safety valves, plug cocks, pipes and fittings. Describes Tuflad armoring, application and specifications. Gives installation, operating recommendations. Process Equipment Div., Lapp Insulator Co.

MAINTENANCE

141 **Industrial Painting**—A precision painting service, including necessary preparatory operation, available for power stations, plant interiors, machinery, conveyors, piping and tanks, is described in this 8-pp illustrated bulletin. Subjects treated include general and spray painting, preparatory work, protective coatings, roof coatings, concrete restoration, waterproofing, insulation. Murray Brothers.

142 **Good Grooming for Plant Grounds**—How mechanized equipment is used in year-'round grounds maintenance is covered in this set of bulletins. They describe and picture company's Model G tractor with attachments ranging from snow plow to light grader; a sickle bar for use with the Model G; the Model F Chief with gang mower combination; and the Model 72 power take-off rotary especially suited for industrial mowing where heavy dense growths are a problem. Bulletins provide selection information, specifications on equipment shown. Worthington Mower Co.

AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

135 **Heating, Ventilating Units**—Catalog 1620, 40 pp, helps the plant engineer plan, specify and order the proper heating and ventilating units (air volumes from 1200 to 23,000 cfm; heating capacities from 100,000 to 2,500,000 Btuh) for moving, heating or cooling of air. Five data sections cover descriptive, performance, layout, engineering and service. For determining unit size, a step-by-step procedure is included. Hypothetical problems show proper use of performance data, curves and charts in selecting correct unit. Sturtevant Div., Westinghouse Electric Corp.

136 **Steam, Liquid Control Equipment**—Catalog 54, a 56-pp edition commemorating this company's 40th anniversary, is arranged for easy reference. Covers pressure regulators, temperature regulators, combination regulators, float valves, strainers, pop safety valves, relief valves, diaphragm valves, motor-operated and solenoid valves. In this book, tabular matter is simplified for quicker reading of specifications. Included are quick reference tables on pressures and temperatures, water heads and equivalent pressures, and flange data. O. C. Keckley Co.

137 **Hot Water Storage Heaters**—Catalog 18, 48 pp, illustrated in color, describes company's line of hot-water storage heaters, presents information on piping arrangements, installation data. Catalogs horizontal and vertical heaters as to weights, dimensions, construction, capacities—with conversion tables. Includes piping diagrams for high and low pressure steam systems, step-by-step guide for setting up and connecting a storage heater. Gives average water requirements of typical hot water fixtures in various types of buildings, showing how hot water capacity needs are calculated. The Patterson-Kelly Co., Inc.

143 **Coatings for Insulation**—Manual 545, 20 pp, is a revised reference manual on adhesives, sealers, vapor barriers, surface coatings for use with insulation. Gives technical product data, application specifications. Includes handy reference chart covering 31 products, giving information on uses, application, and drying time. Benjamin Foster Co.

144 **Heat Exchangers**—The full story of aluminum heat exchangers is covered in this 24-pp booklet on aluminum heat exchanger tubes. Presents economics in using company's heat exchanger tubes, types of tubes, and an explanation of corrosion protection provided by cladding; discusses successful applications in various industries. A list of typical commodities handled or processed in aluminum equipment is provided. A section on fabrication, including general design data and alloy recommendations, and a technical data section are included. Aluminum Co. of America.

145 **Aluminum Duct Systems**—This 32-pp technical booklet, is designed to give plant engineers practical data on friction losses in air conditioning duct systems. Contains graphs determining friction losses in round aluminum ducts and fittings; computation for duct heat loss or gain. Gives step-by-step design procedures for sizing round and rectangular ducts. Kaiser Aluminum & Chemical Corp.

Reader Service Cards for ordering bulletins are on pages 171-172. Be sure to include your name, job title, and company.

PUMPS, COMPRESSORS

146 **Centrifugal Pump Fundamentals**—Form 7287, 12 pp, explains in non-technical language, and diagrams, the principles of operation of centrifugal pumps. Defines terms used in pump calculations, works out typical problems. Cameron Pump Div., Ingersoll-Rand Co.

147 **Centrifugal Pumps**—Bulletin 1001B, illustrated, presents full-pp cut-away diagram of company's Type GS centrifugal pump, in sizes from 2½ to 4 in., capacities to 400 gpm, and heads to 230 ft. Describes such maintenance and service features as rotor assembly, which contains all working parts and lifts out of casing as single unit. Gives specification data. De Laval Steam Turbine Co.

148 **End-Suction Pumps**—Bulletin 4011, 12 pp, gives design features, construction materials on the new end suction centrifugal pumps, sizes from 1- to 5-in. discharge; capacities to 1000 gpm; maximum heads to 250 ft.—with electric motor, or for belt drive or pump only. Contains 7 pp of performance tables and curves, (1750 and 3500 rpm); approximate dimensions in inches. The Deming Co.

149 **Centrifugal Pumps**—Bulletin G-1000 presents the Chempump, a centrifugal pump designed for minimum maintenance. Cutaway illustration shows design details of this simplified pump and brief text discusses low installation costs, elimination of seals and stuffing boxes, wide choice of materials, other features. Includes dimensions. Chempump Corp.

150 **Screw Pumps**—Twelve-pp Bulletin S-205 is devoted to company's standard gear-in-head, high pressure long body gear-in-head, and standard vertical gear-in-head types. Basic construction and design are discussed in detail and there are sectional views with indicated features, also installation pictures. Dimensions are included. Warren Steam Pump Co., Inc.

151 **Metering, Proportioning Pumps**—Bulletin KP-54, 6 pp, describes manufacturer's line of K type metering and proportioning pumps and their operation. Gives capacity and pressure information. Hills-McCanna Co.

152 **Rotary Compressors, Vacuum Pumps**—Bulletin 16B8126, 12 pp, explains operation, construction of manufacturer's single-stage water-cooled rotary compressors and vacuum pumps, described as applicable to every air or gas handling requirement. Cites savings in cost; gives specifications, typical air piping arrangement diagrams. Allis-Chalmers Mfg. Co.

153 **Compressors**—Bulletin A-72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

154 **Machinery Maintenance Manual**—While this 16-pp illustrated handbook is slanted to the sugar industry, it will be of interest to all plant engineers concerned with repair and protection of machinery. Presented in case history form, each example represents a problem solved with soldering, brazing or welding materials and procedures. Step-by-step photos show method. Eutetic Welding Alloys Corp.

155 **Jig, Fixture Components**—Catalog 10, 86 pp, presents a recently expanded line of standard jig and fixture components. Full-scale layouts of each fixture are shown. New products included in this catalog are plain fixture keys, heavy-duty jacks, and ductile iron bar knobs and speed handles. A pictorial index is provided. Lodding Inc.

(More Bulletins on page 174)

Space and location are rarely a problem

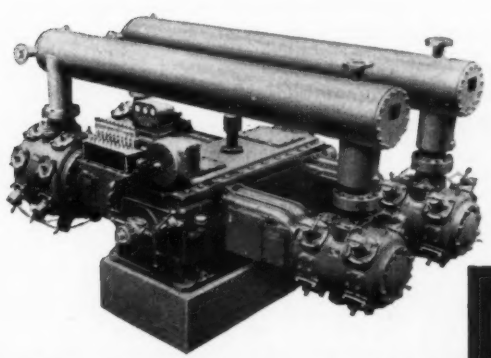
One of the biggest factors in determining the location of an air compressor is its foundation requirements. Obviously, the more a compressor vibrates, the heavier the foundation must be.

You won't face such problems with a Clark Balanced/Opposed, Motor Driven Compressor. There are no vibrations . . .

They're all cancelled out!

If you'd like to install a Clark unit on an upper floor that's structurally strong enough to support its weight, *do it* . . . and you won't need much space, either. Its compact design permits installing a large amount of horsepower in a limited floor area . . . and its precision construction means you can practically forget about it once it's in operation.

For complete details on this truly modern air compressor in the 150 to 4500 hp range, write for Bulletin 118 or get the facts first hand from your nearest Clark representative.



CLARK BROS. CO. • OLEAN, N. Y.

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Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON

CLARK **balanced/opposed compressors**

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With these, YOU can be an EXPERT ON PACKINGS!

Yes, without even the usual "one easy lesson", your NYB&P Distributor can make it possible for *you* to select quickly the right NYB&P packing for *any* normal application!

First, he'll provide you with the unique double-disc Packing Selector shown above. By one simple movement of the dial you can select the correct NYB&P style number to pack your pump or hydraulic press for any combination of operating conditions.

In addition, your NYB&P Distributor will gladly give you the most helpfully informative packings catalog ever published! Within its 40 pages you'll find time-saving tables, formulas and installation data, as well as descriptions of NYB&P's extensive line of packings and gaskets. Highlighted in this catalog is the famous "Line of Nine" which enables you to solve 90% of industrial packing problems from a simplified inventory of only 9 versatile types.

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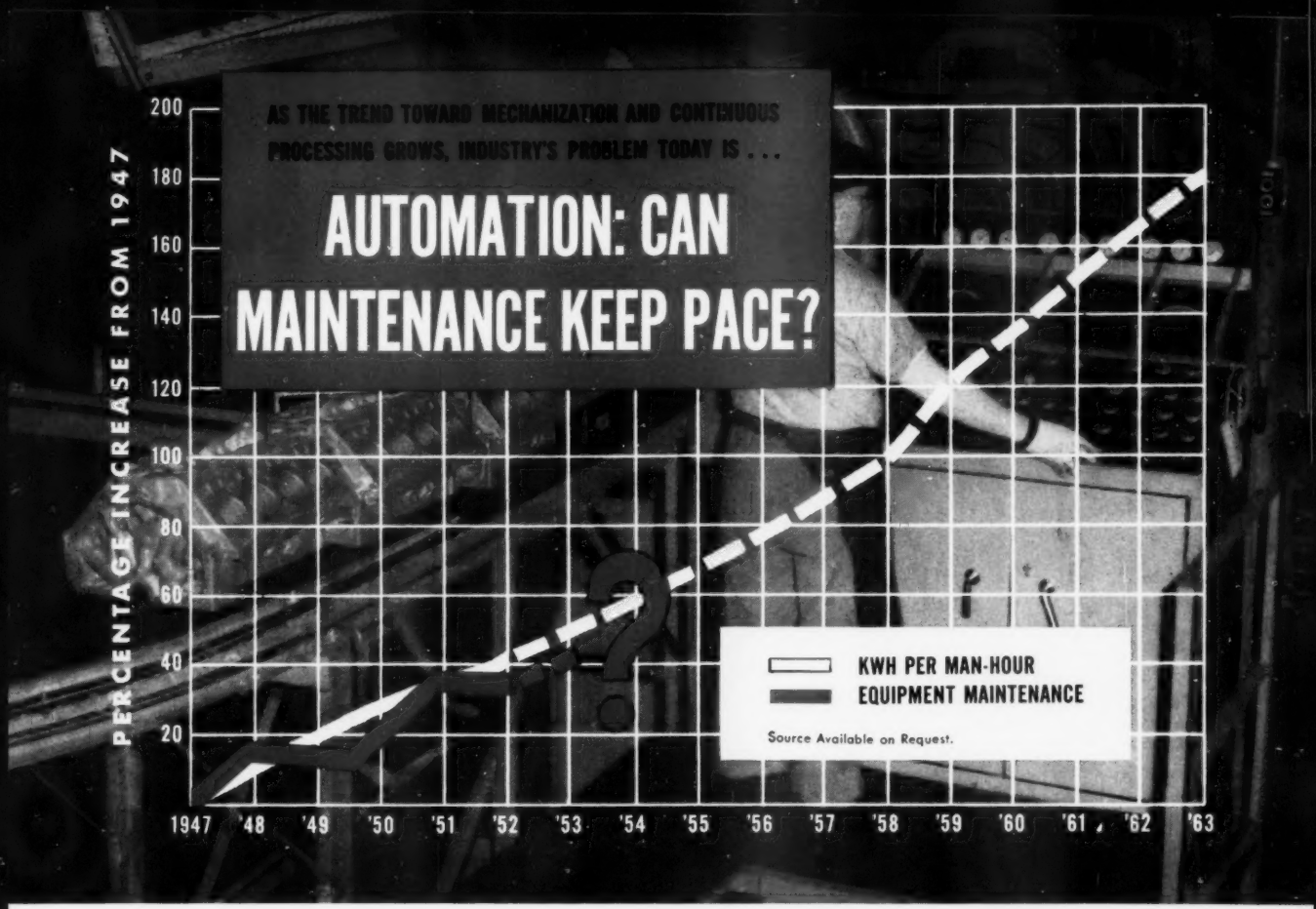


One answer is General Electric's 5-step *Productive Maintenance* plan

- **More is expected from maintenance as industry continues its drive to reduce product costs**
- **And as kilowatt-hours per man-hour hit new peaks, trends toward automation are forcing a closer look at maintenance procedures**
- **But 9 out of 10 electrical maintenance programs are obsolete in one area or another**
- **To help maintenance keep pace, General Electric offers a 5-step *Productive* Maintenance plan**

In every industry, operations are constantly being made more efficient to increase output, quality, and reduce product cost. Plant electrification is expanding . . . more continuous processing lines are being set up . . . the first steps toward automation are being taken.

To help reduce product cost, similar planning and new techniques must be applied to maintenance. For this reason, General Electric has worked out a step-by-step plan called "Productive Maintenance." With it, you can organize an electrical maintenance program that will measure up to the constant drive for more production at lower cost.

Notice that G.E.'s plan is called *Productive maintenance*, and not preventive maintenance. There's a big difference. Maintenance must go beyond any negative concept . . . to where it is fully as important as production itself.

SEE THE NEXT 7 PAGES for the five basic steps in every *Productive* Maintenance Plan, specially designed to help you deliver more production for every maintenance dollar.

GENERAL ELECTRIC

TURN PAGE FOR 5-STEP PLAN

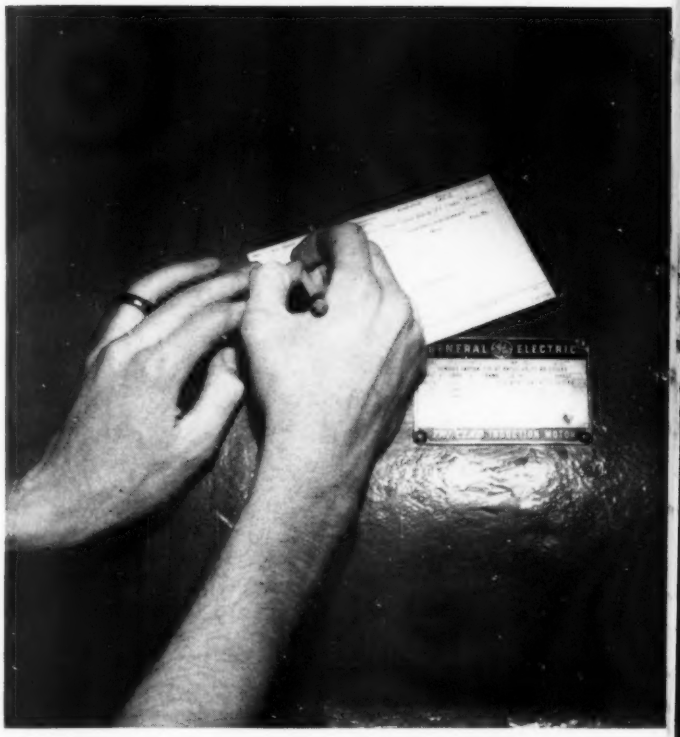
G.E.'s *Productive Maintenance* Plan

STEP 1 Gather complete equipment data

Start your *Productive Maintenance* plan by making a complete equipment inventory. The resulting record system will be a basic part of your entire new maintenance program

As your first step, determine *what* electrical equipment you have in your plant and *where* it is. An inventory number should be assigned. Usually, a system that indicates building, floor, and machine number is used conveniently for this purpose.

HERE'S WHAT YOU MUST KNOW. A well-edited record sheet or card should include a description of the equipment, application, rating, serial number, manufacturer, purchase order number, inventory number, and cost information.



TO BE EFFECTIVE, a Productive Maintenance Plan begins with a complete inventory of all plant equipment.

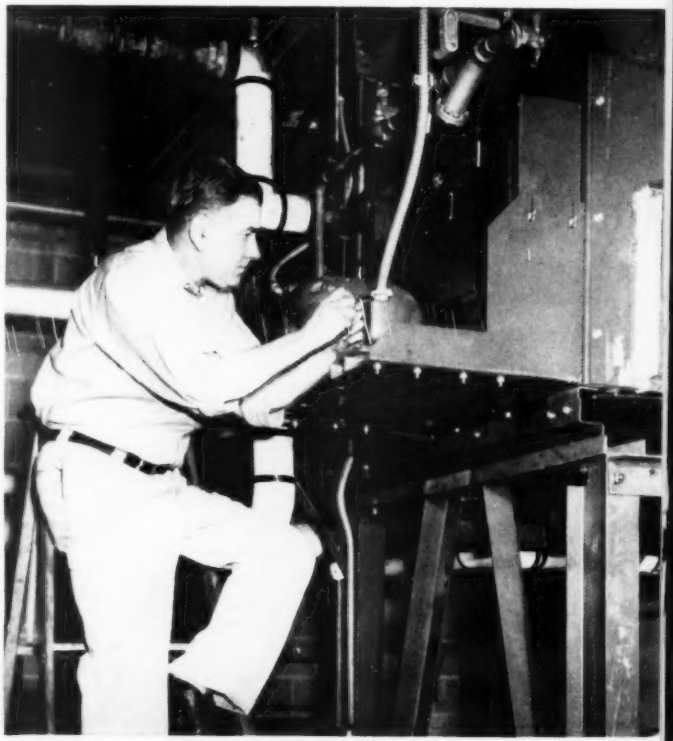
G.E.'s *Productive Maintenance* Plan

STEP 2 Determine extent of routine maintenance

Determine the amount of maintenance necessary for your electrical system. Some equipment will be excluded from the plan

Select equipment on which maintenance effort is to be expended in your program. Include only those items where *Productive* Maintenance will pay, or help make workers safe.

Anybody can do a complete routine maintenance job—but it may be unnecessarily expensive. In some cases, it will be cheaper to replace or repair a part or the entire piece of equipment after it breaks down, rather than use high-cost manpower to inspect and maintain it. Equipment that is not considered important enough to be brought into the *Productive* Maintenance plan can be repaired in answer to non-scheduled requisitions by production supervisors.



NON-CRITICAL EQUIPMENT, such as the motor for this air-conditioning unit, may not warrant being included in the plan.

G.E.'s *Productive Maintenance* Plan

STEP 3 Establish a routine operating control system

Put the equipment data you gathered in Step 1 to work. Use it to set up inspection schedules, work orders, renewal parts stocking system and to record costs

WORK OUT YOUR INSPECTION CYCLE. Consider the duty and application of all equipment. Then strike an inspection balance between "too often," with resultant waste of money, and "not often enough," with the possible damaging equipment outages that occur. The repair record will tell if more attention is needed. Ask your maintenance men to note on their check lists or report forms whether the frequency of inspection can be increased or decreased.

DEVELOP A WORK ORDER PROGRAM for routine maintenance work. Although there is no such thing as a universal work order (each plant must develop its own) certain essential information should be included on each. The work order ought to include a job number, job location, department number for charging purposes, the craftsmen required, the date required for completion, a description of the work to be done, an estimated and actual cost for labor and materials, and approval spaces.

GET RENEWAL PARTS RECOMMENDATIONS. Have your electric equipment manufacturer study the equipment recorded in your file. He will recommend the type and quantity of renewal parts you should stock. List these parts on the record card so the responsible maintenance man can determine immediately what parts are authorized for stock, and can identify these parts by number.

SET UP AN INVENTORY CONTROL SYSTEM. Estimate the approximate turnover rate for each part, procurement time, and the cost of acquisition to determine the minimum stock level to act as a reorder signal. To prevent duplication of identical parts sold under different numbers by different suppliers, cross-reference the parts numbers, and maintain the stock under only one number.

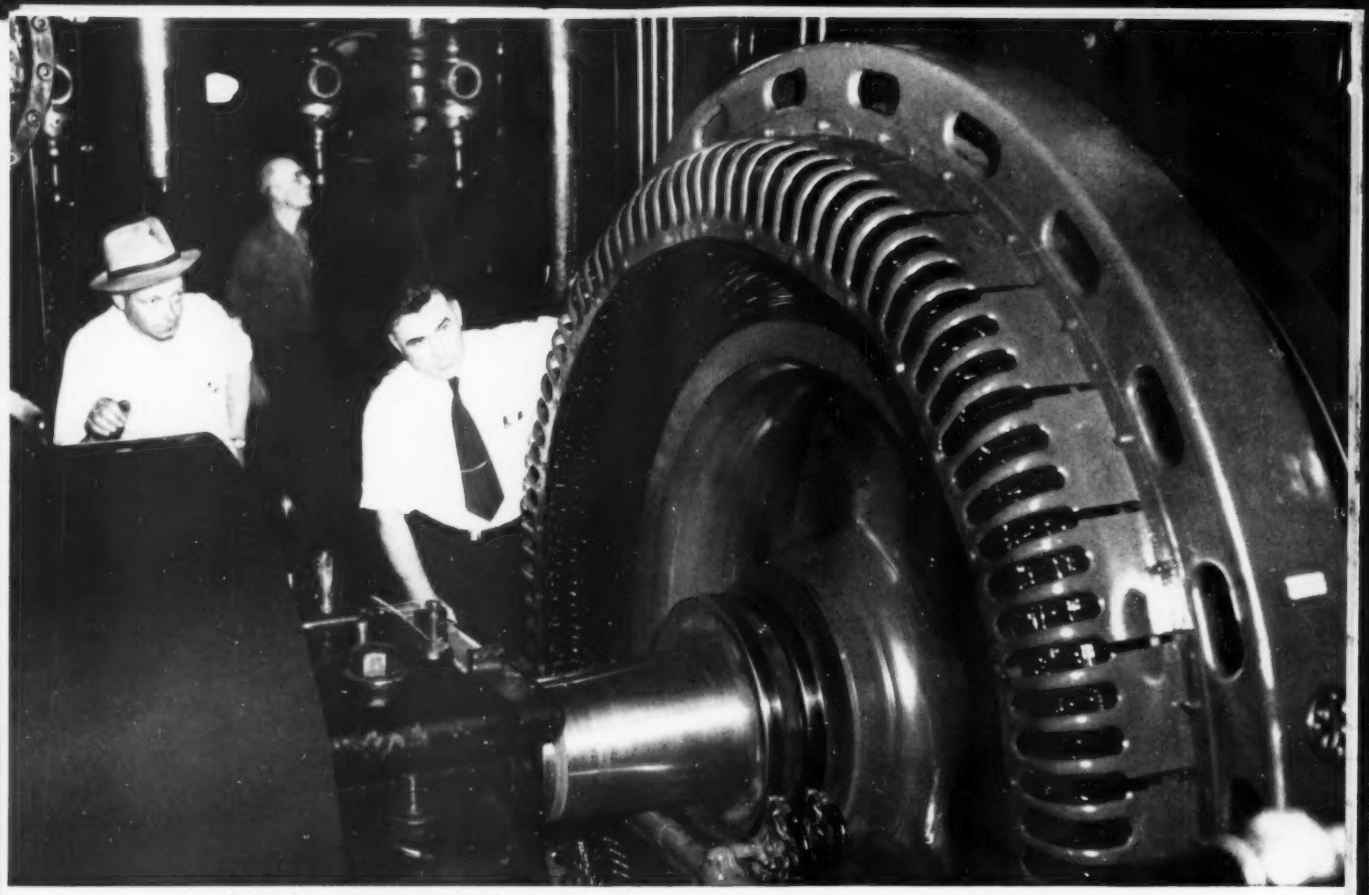
PURCHASE PARTS FROM ORIGINAL SUPPLIER—it's the best practice. The original supplier will have a greater interest and responsibility in the equipment operation. Parts will be the same dimensions, will have the same or better quality, and will be constructed to take advantage of recent engineering advances.

THE HEART OF ROUTINE MAINTENANCE is the keeping of proper, up-to-date records and paper work.

THE RECORD OF LOST TIME will tell you if inspection is balanced between "too often" and "not often enough."

GENERAL ELECTRIC

TURN PAGE FOR STEP 4



YOUR EQUIPMENT SUPPLIER will help you determine the condition of units on your critical list.

G.E.'s *Productive Maintenance* Plan

STEP 4 Evaluate for critical maintenance

List all equipment vital to production and inspect it thoroughly. Then, determine the critical-parts protection you need for each key machine

Close co-operation between Production and Maintenance Departments is necessary to determine what electrical equipment is vital to production. Together, these two groups must evaluate the functional importance and duty cycle of all electrical equipment included in your *Productive* Maintenance program.

WHEN IS EQUIPMENT CRITICAL? When its failure directly or indirectly interrupts or delays production. This is appraised by such things as high percentage of utilization, or lack of bypass equipment. Set up this list of equipment in order of importance.

INSPECT ALL EQUIPMENT on this critical list. Your equipment supplier, who has wide experience with his equipment under every type of operating condition, can help you determine the condition of critical units. Consider such things as age, duty-cycle, surges, and overloading. Based on this inspection, make a list of equipment on which the probability of breakdown is high. You will need this information to set up a planned overhaul schedule as discussed in Step 5.

HOW MUCH PROTECTION do you need for each key piece of equipment? The following steps will help you arrive at an answer to this question:

1. Calculate repair time under the following conditions assuming major failure:
   a. No critical parts stocked
   b. Some critical parts stocked (such as coils)
   c. All critical parts stocked (such as complete armature)
   d. Complete unit stocked
2. Determine cost of repair and inventory for each of the possible conditions.
3. Total this information to determine the total "failure cost."
4. Analyze total cost for each condition to determine what you must stock to protect the equipment.

The sample analysis chart at right shows you the factors involved in determining the best degree of protection at the lowest cost for each piece of critical equipment on your list.

Here is an example of how a *Productive Maintenance* analysis determined the best over-all protection for one specific motor doing one specific job:

EVALUATION OF CRITICAL PARTS PROTECTION REQUIREMENTS

(The evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

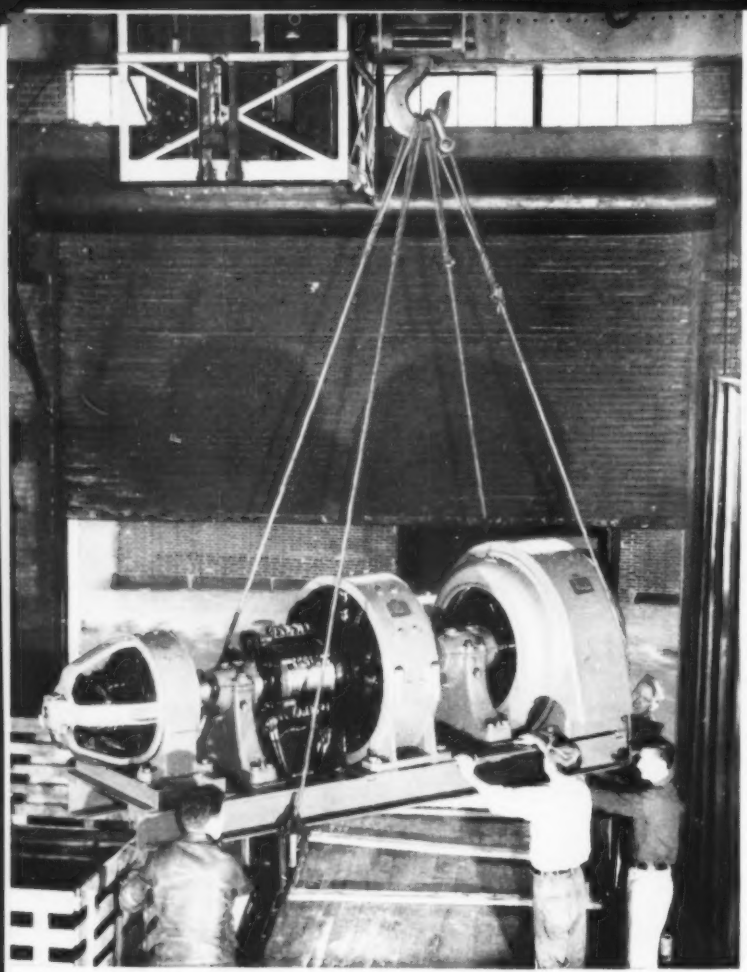
X Add disassembly, assembly and transportation time to actual repair time.

* Add repair cost, on straight time basis, of failed unit. This will be stocked for protection against future breakdown.

IN THIS PARTICULAR CASE HISTORY, the motor involved was a 500-hp slow-speed d-c motor on a machine critical to production at a large western paper mill. The problem was to determine how much an armature failure would cost. Downtime was estimated at $700 per hour. A G-E Maintenance Specialist helped the customer decide to stock a complete armature for best protection.

GENERAL ELECTRIC

TURN PAGE FOR STEP 5



PLANNED OVERHAUL, scheduled in advance, cuts outage time, reduces repair costs.

A CRITICAL MACHINE, like this motor-generator set, should have a rigid time schedule for servicing.

G.E.'s *Productive Maintenance* Plan

STEP 5 Establish a critical maintenance program

Minimize downtime costs two ways: by stocking critical parts, and by scheduling overhaul well ahead.

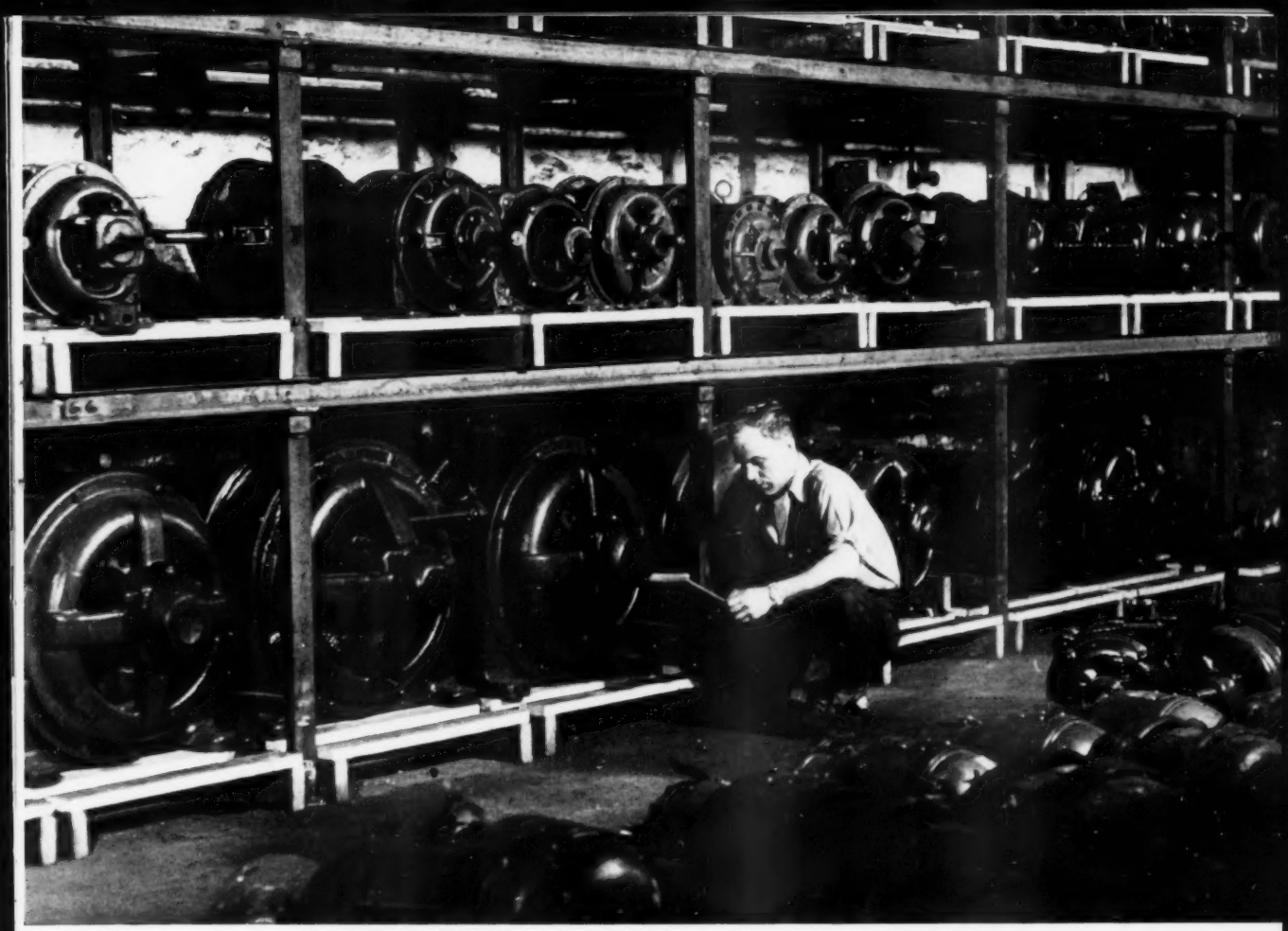
In Step 4, you determined the right degree of protection for each piece of critical equipment. Now take the action step—set up your critical maintenance program.

WHICH PARTS ARE MOST IMPORTANT? Get them *first*. Then organize your budget so that you can purchase the rest of your critical stock on a planned basis. Remember, too, that your critical equipment demands a more rigid schedule of inspection and service. Maintenance schedules must be more complete, and you must keep closer records of all operations, failures, maintenance and operating costs.

SCHEDULE PLANNED OVERHAUL of equipment inspected and listed in Step 4 on which probability of breakdown is high. Consider the difference in cost between planned overhaul and outage. Planned overhaul is effective after equipment has operated over a reasonable service life. You use it to remove from operation, on a systematic basis, the equipment that needs overhaul. You make this equipment available for inspection and complete rewinding, rebuilding, or modernizing at times most favorable to production. Result: the gap between actual and theoretical maximum production on the part of a machine is narrowed.

SCHEDULE PLANNED OVERHAUL WELL AHEAD, so all the necessary men, tools, and material for the work can be made available at the proper time both in your plant and in the repair shop. Overhaul can be set for normal downtime, vacation closing, holiday shutdowns, or for off-season production periods. Your objective should be to disturb production as little as possible.

PROBABLE RETIREMENT OR REPLACEMENT of every piece of critical equipment should be considered in this step. This means production requirements must be



ORGANIZE YOUR BUDGET to purchase the most important critical parts first.

projected into future years. If the anticipated usage of the equipment is only for a short period, it may be economical to assume the risk of operating over that period without planned overhaul, and depend entirely on inspection and routine maintenance.

HOW ABOUT AN OVERHAUL "PACKAGE"? There will be cases where you can schedule overhaul of dependent or secondary equipment at the same time as your major apparatus. In other words, for minimum downtime, overhaul should not be thought of by *machine,* but rather by *manufacturing operation.*

Setting up a Productive Maintenance program is a big job. None of the steps is simple. But by carrying them out, you will show a steady increase in the efficiency of your maintenance program. You will be able to prove that Productive Maintenance is one of the most important and productive functions in your plant's operation.

GENERAL ELECTRIC WILL HELP YOU SET UP YOUR PROGRAM

GENERAL ELECTRIC

THE PROBABLE RETIREMENT of a critical piece of equipment must be considered when setting up overhaul schedules.

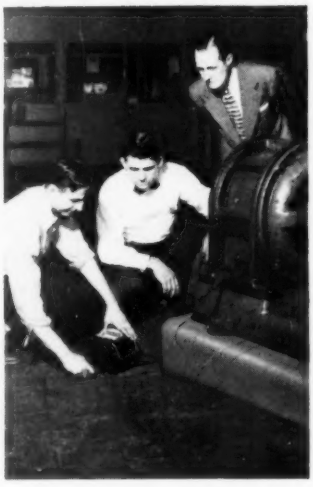
HERE'S HOW G.E. CAN HELP

How G.E. can help you set-up your *Productive Maintenance* Program

Your G-E Apparatus Service Shop representative is a Maintenance Specialist. He will work with you to simplify the job of setting up a *Productive* Maintenance Program in your plant. Call him in for help in the five areas listed below.

YOUR G-E MAINTENANCE SPECIALIST will supply complete parts data . . .

. . . guide you in planning routine inspection, routine maintenance and parts inventories . . .



. . . help you determine condition of all critical equipment and help schedule planned overhaul . . .

. . . help analyze critical equipment for best protection of each machine.

1—SUPPLYING COMPLETE PARTS DATA. Ask your G-E Maintenance Specialist to supply you with the identification of the various renewal parts in each piece of electrical equipment. Your basic records won't be complete without this information.

2—PLANNING ROUTINE INSPECTION AND MAINTENANCE. He can help you organize inspection trips and routine maintenance work by looking over your system, estimating how often equipment will need attention, and offering guidance on the best means of upkeep.

3—ESTABLISHING ROUTINE RENEWAL PARTS INVENTORY. Your G-E Maintenance Specialist can tailor a renewal parts program for your plant and guide you in establishing your parts inventory system.

4—ANALYZING CRITICAL EQUIPMENT FOR BEST PROTECTION. Ask your G-E Specialist to tell you just how long critical equipment repairs will take and how much each job will cost. He'll be glad to help you determine the best protection for each piece of vital equipment.

5—DETERMINING CONDITION OF CRITICAL EQUIPMENT. Your G-E Maintenance Specialist can help you assess the condition of all critical electrical equipment. And he can schedule men and machines at the G-E Service Shop to help you during planned overhauls.

FOR DETAILED INFORMATION:

General Electric Company
Apparatus Sales Division, Section A801-14
Schenectady 5, New York

☐ Please send me the detailed manual (GEA-6087) on setting up a Productive Maintenance Program in my plant.

☐ Please have a Maintenance Specialist from my nearest G-E Service Shop call on me.

NAME .....

POSITION .....

COMPANY .....

CITY ..... STATE .....

Productive Maintenance —as vital as production itself!

GENERAL ELECTRIC

WE'LL PROVE OSPHO STOPS RUST

Let's talk straight from the shoulder. In the first place, OSPHO is NOT a paint . . . it is a metal primer. Technically speaking—a carefully balanced formula of Orthophosphoric and Dichromate with extenders and wetting agents. *OSPHO is applied directly over rust* and when thoroughly dry, paint. *Will it stop rust?* YES!!!

Here's how you can prove it. SEND FOR YOUR FREE TRIAL SAMPLE OF OSPHO. Select a heavily rusted surface. Brush off loose rust and scale (no sandblasting or flame-cleaning necessary), then brush or spray OSPHO. When thoroughly dry, scrape the surface with a knife and you'll find OSPHO so tightly adhered to the rust that it is like scraping rough glass, a perfect base for paint. A chemical change has taken place. Iron oxide (rust) has turned to iron phosphate, an inert, hard, dark grey substance. OSPHO has stopped the rust action and primed the metal for paint. Remember, with OSPHO you don't have to remove the rust, paint jobs last two to three times longer, and you save on preparation time, on paint, and the cost of application. Repeat orders are constantly being received. There's nothing like satisfied customers.

OSPHO is supplied in gallon bottles @ $3.00, 10-gallon kegs @ $2.80 and 50-gallon barrels @ $2.60 F. O. B. Cleveland, Ohio.

Don't remove the rust—apply OSPHO. OSPHO forms a perfect bond between rusted metal and new paint. *Rust action has stopped!*

Use the coupon for a free trial supply.

A few choice territories open—distributors' inquiries invited.

Please send a Free trial supply of OSPHO

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RUSTICIDE PRODUCTS CO.
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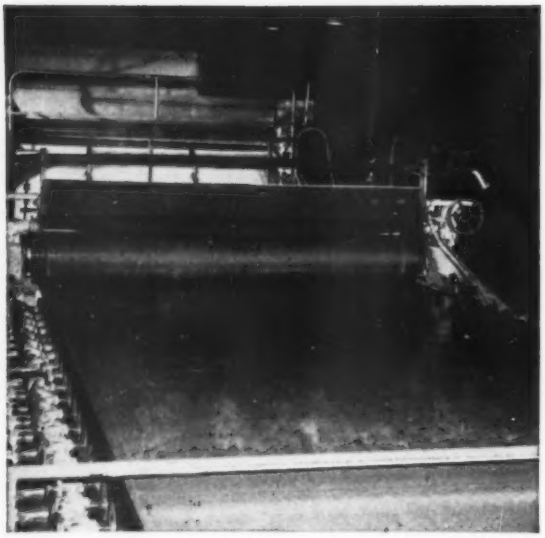
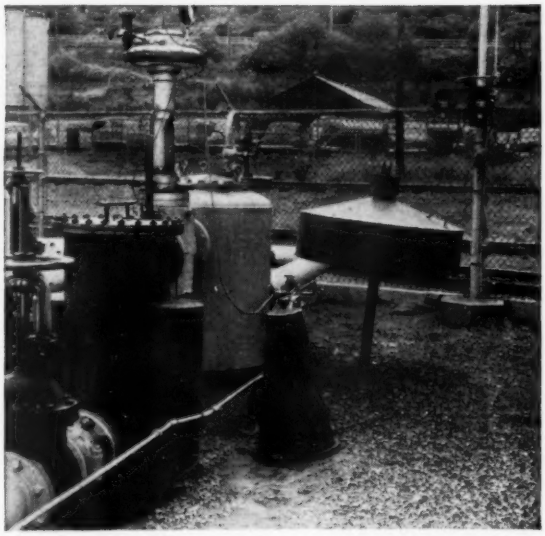


FLUCTUATIONS IN VACUUM LINES *are sensed by a Honeywell mercury switch Vacuumstat which controls intermittent water spray on a paper machine Fourdrinier section. Costly continuous shower is thus eliminated at the Combined Locks Paper Co., Little Chute, Wis.*

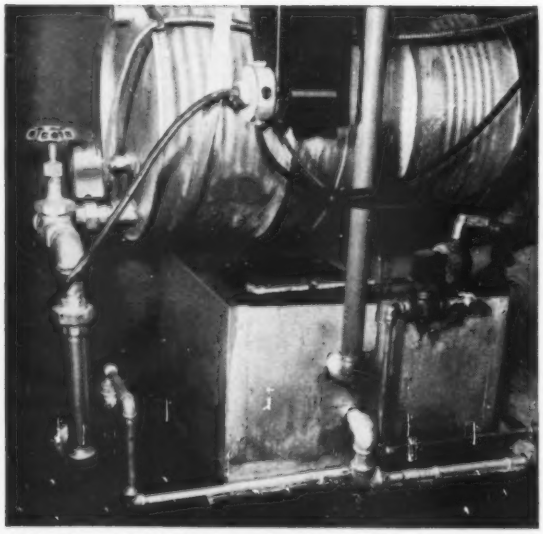
Control equipment cost—$23.00*



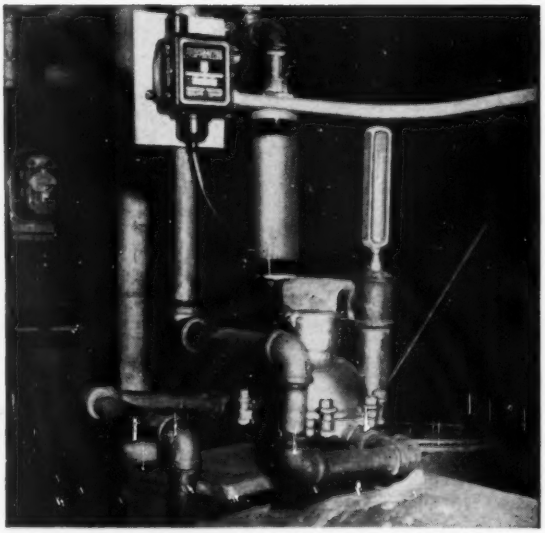
NO MORE RUPTURED STRAINERS *at the General Petroleum Corp. terminal in Portland, Ore., since a Honeywell Differential Pressure Controller was installed to warn of excessive scale load. Plant costs are greatly reduced because oil strainer replacements are eliminated.*

Control equipment cost—$55.00*

Honeywell
Industrial Controls

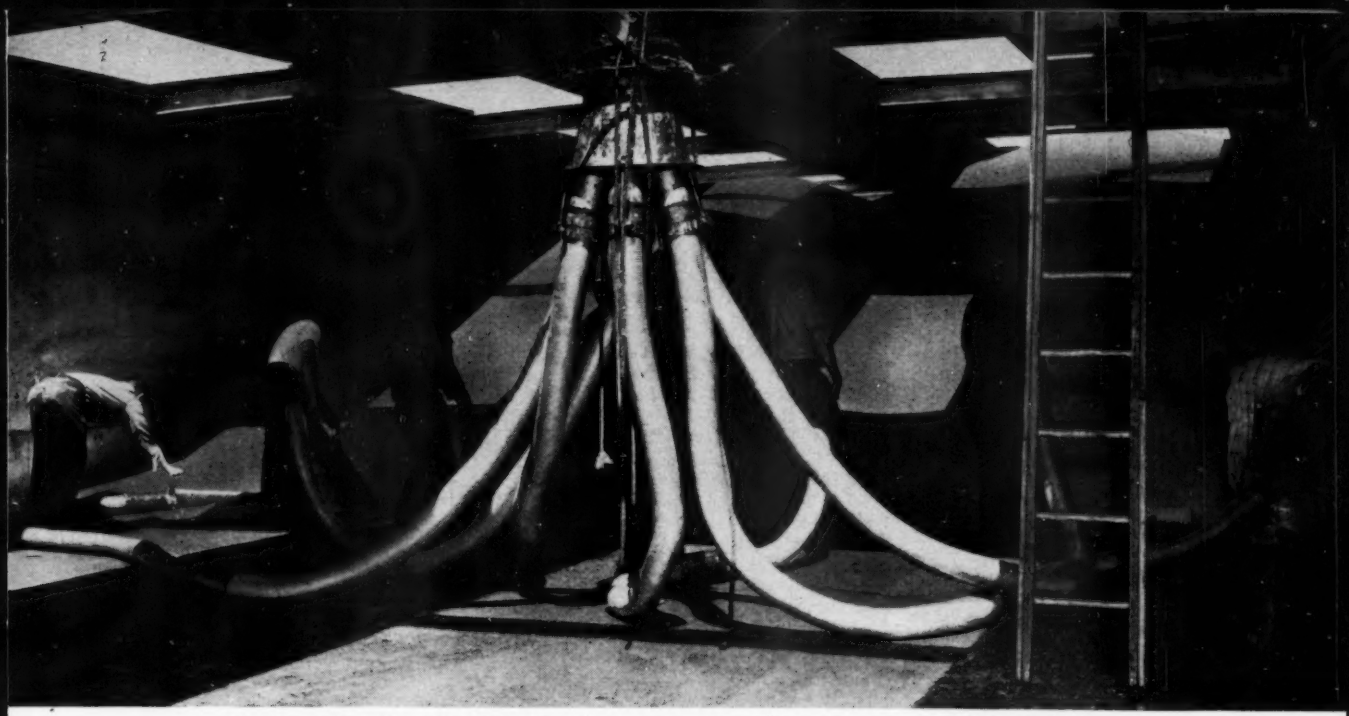


RECIRCULATION OF TREATED COOLING WATER, *after it has become heated, is facilitated by a Honeywell immersion type Aquastat Controller. At the Atwood Vacuum Machine Co., Rockford, Ill. it is used in a homemade cooling unit for a high frequency converter.* **Control equipment cost—$12.50***



STEAM COSTS ARE REDUCED *at the Spaulding-Moss Co., Boston, Mass. by the daytime storage of steam-heated water for after-hour use. A Honeywell Aquastat Controller here regulates steam in the hot water tank.*

Control equipment cost—$12.50*



SUCTION HOSE LINES CAN'T PLUG UP *and cause expensive delays when vacuum and line loads are regulated by Honeywell Controls. Here the Oregon Commission of Public Docks keeps grain ship unloading running smoothly with Honeywell Industrial Motor, Relay and Pressuretrol.*
Control equipment cost—$174.25*

Reduce costs

THOSE who know that attention to costs is smart business have often found the answer to their cost reduction problems in the surprisingly inexpensive use of simplified controls.

In the shipping industry, for example, cost-paring Honeywell Controls speed grain ship unloading—frequently to the extent of permitting an extra cargo trip each year.

Hundreds of Honeywell Industrial Controls serve an expanding variety of needs—whether they be the preventing of production tie-ups . . . freeing of experienced personnel for more responsible duties . . . avoiding waste and rejects . . . conserving of processing or treating agents.

Low-cost Honeywell Controls are as uncomplicated in operation as in construction . . . designed to do a specific job effectively, inexpensively.

Throughout your plant there are many opportunities for Honeywell Controls to save you money . . . as well as speed production, lower maintenance, increase quality.

Your nearby Honeywell sales engineer will welcome the occasion to discuss how you can reduce costs through the use of these controls. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa. *Also manufacturers of a complete line of precision measuring, recording and controlling instruments.*

**List Price—subject to change without notice*

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Identified by the BLUE FIBERGLAS BACK

How a 'Sexauer' Easy-Tite faucet washer costing pennies can save you $115.22 a year!

A tiny, 1/32" faucet leak wastes 95,040 gallons—*$24.14* worth*—of water yearly.

Hot water leakage is even costlier . . . Fuel waste adds upward to *$91.08*** more to the loss. Total down the drain: *$115.22*.

And this is the dollar loss caused by only *one* pinpoint leak!

Fuel Waste		Water Waste	Total Waste
Oil	(792 gals.) **$91.08	$24.14	$115.22
Coal	(9,879 lbs.) 88.91	24.14	113.05
Gas	(84,411 cu. ft.) 84.81	24.14	108.95

*Water costs (figured at $1.90 for 1,000 cu. ft.) authenticated by Hackensack Water Co. **Fuel costs authenticated by American Gas Association.

Save money; cut costs; stop leaks with dependable 'Sexauer' Easy-Tite faucet washers.

Built like a tire with Fiberglas reinforcement

Easy-Tite faucet washers are made of a special du Pont product, instead of rubber, and reinforced with Fiberglas. The result is a washer that resists the closing squeeze that splits and mushes ordinary washers. And Easy-Tites withstand destructive heat (up to 300° F. by test). These features explain why *'Sexauer' Easy-Tites outwear ordinary faucet washers 6 to 1!*

By avoiding labor on those 5 additional repairs, Easy-Tites cut today's high maintenance costs 83⅓%! But Easy-Tites not only save water, fuel, labor; they also prolong the life of expensive fixtures.

FREE CATALOG Easy-Tite faucet washers are just part of the line of over 3000 'Sexauer' Triple-Wear plumbing repairs parts and patented precision tools.

Get complete information on Easy-Tites and other cost-cutting 'Sexauer' materials. Send for our FREE, new, 118 page Catalog H. Fill in and mail the coupon today.

J. A. Sexauer Mfg. Co., Inc., Dept. S-74
2503-05 Third Ave., New York 51, N.Y.

Gentlemen: *Please send me a copy of your FREE, new, 118 page Catalog H.*

My name ..... Title .....

Institution .....

Street .....

City ..... Zone ..... State .....

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 529 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

An Unusual Request

PLANT ENGINEERING:

"In the March, 1954 issue of PLANT ENGINEERING I came across a picture of an 'old friend.' Between pages 168 and 169 there was a color advertisement by Air Reduction Co., showing the *SS Southern Cross*. I served on her before the war.

"I wonder if it would be possible to get a copy of this advertisement. I would also appreciate your informing me where and how I can get a copy of the original photograph, perhaps that would be a better view." *William R. Colbert, Power Plant Supervisor, Container Corp. of America, Wabash, Indiana.*

► We are notifying the Air Reduction Co. of the great service which they did for you in publishing a picture of your "old friend" the *SS Southern Cross* in the insert which appeared in the March issue. We are also asking Mr. Walter Goerg, of Air Reduction Sales Co. if it would be possible to get you a print of the original photograph.—*Editors.*

Maintenance Article Hits Target

PLANT ENGINEERING:

"In the May, 1954 issue of your publication appeared an article entitled 'Design and What It Does to Help Maintenance.'

"Mr. Paul Lindholm, the author, has quite obviously had practical experience in the problems of a maintenance operation in a large manufacturing plant. He has clearly voiced principles which have direct application to our situation at this plant, and we are anxious to obtain 10 reprints of this article." *G. R. Lackey, Construction Engineer, Douglas Aircraft Co., Inc., Long Beach, Calif.*

More Info on ZRC

PLANT ENGINEERING:

"Please send me additional information regarding the zinc coating described in the March issue.

"From the description it appears that this material can be painted on steel and cast iron surfaces without extensive preparatory cleaning so that it will 'cold-galvanize' the area to be protected

"This is very interesting to us and we would appreciate information as to source of supply and prices." *E. F. Sperling, Vice President, Director of Engineering, Helms Bakeries, Los Angeles 31, Calif.*

Grouting Problem

PLANT ENGINEERING:

"I am having trouble with cement grouting under bed plates on a gear train in a sugar mill. I would like to find out if there is a grouting that is stronger and will not shrink like cement grout or is there a way of strengthening a cement grout." *Harry A. Chris, 319 Druilhet Street, Jeanerette, Louisiana.*

► Mr. Chris would appreciate hearing from readers who may have the answer to his problem.—*Editors.*

This Reader Aims to Find Out

PLANT ENGINEERING:

"The article in the May, 1954 issue entitled 'Is It True What They Say About Moly?' is very thought-provoking.

"My curiosity has been raised to the point of getting more information on 'Moly.' The company I am employed by manufactures lathes and one prime problem is the breakage of gears due to grit and metal particles adhering to the lubricant on the gears.

"Please send more information concerning 'Moly.' The name of the manufacturer, where they are located, prices to original manufacturers, recommended retail prices, etc., is what I require. Also I would like to have a sample with which preliminary tests could be made." *Martin A. Galis, Logan Engineering Co., Chicago.*

► Your questions are being addressed to Mr. L. Heath, District Manager, Climax Molybdenum Co., 230 North Michigan Ave., Chicago 1, for answer.—*Editors.*

To Reprint Filtration Article

PLANT ENGINEERING:

"I wish to thank you for the article 'Filtration Saves Thousands in Maintenance and Materials,' which appears in the May, 1954 issue on page 105.

"Material of this sort is invaluable to our field representatives. We would like to send each of our salesmen a copy of the article. Since we have our own offset printing facilities and since the quantity we require is small, we would like your permission to reprint the article." *Joseph D. Romanow, Sales Promotion Manager, United States Hoffman Machinery Corp., Syracuse, New York.*

► You are most welcome to reproduce this article for the use of your field representatives.—*Editors.*

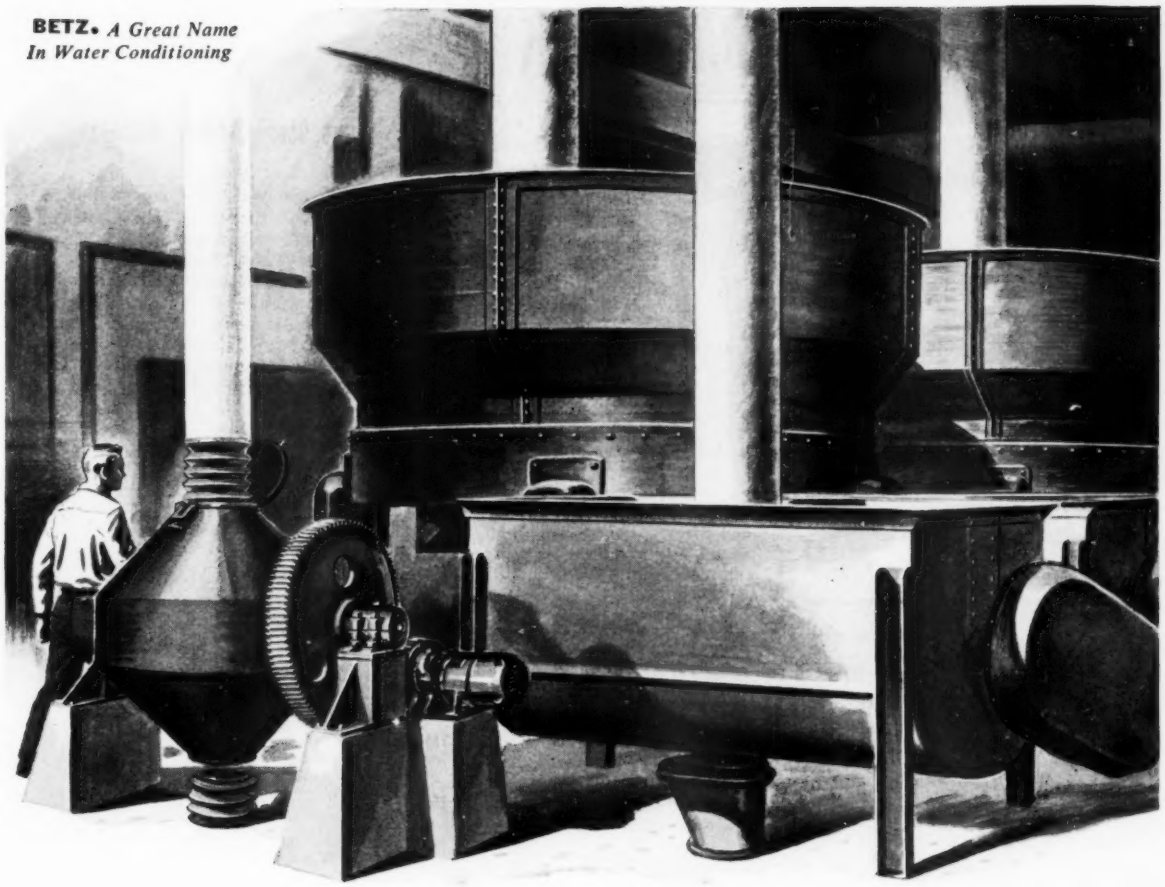
Is It the Driver, or the Floors?

PLANT ENGINEERING:

"In the May, 1954 issue, we read with considerable interest the article written by Willard S. Mielziner, President of the Impact-O-Graph Corp.

"We were unable to find the address of this firm, and we are interested in learning more about this interesting device, and would therefore ask you if you would be so kind as to forward the necessary information." *R. B. Moore, Me-*

BETZ. *A Great Name In Water Conditioning*



If YOU could step into this picture...

. . . you would find yourself in Philadelphia . . . or Texas . . . or California . . . or Montreal . . . in one of the four Betz strategically-located mixing and formulating plants.

Here you would see a battery of giant mixers, whose fingers of steel effortlessly blend and stir thousands of "prescriptions", each formulated to solve some *individual* water conditioning problem for industry. Perhaps you'd notice a special packaging machine, the extremely accurate weighing apparatus . . . or maybe a ton or two of chemicals neatly stacked, ready for formulating.

A little further along, you'd see row upon row of barrels, drums, and boxes ready for shipment . . . each bearing a different contents label.

Perhaps then you'd feel, as many other visitors have, that this division of the Betz Organization *actually performs the function of a giant pharmacy*—the focal point of Betz engineering skill and experience.

And you would profit by your visit, too, since you'd obtain an idea or two on how your plant could operate more efficiently and economically through the use of Betz *completely-integrated* water conditioning service.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa.

In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 530 on Reply Card

PANGBORN BLASTS
by don herold

COST-CUTTING STORY OF THE PANGBORN BLAST CLEANING MACHINE

Pangborn Blast Cleaning Machine—available in six types, stationary or portable—delivers efficient, low cost maintenance in any plant. $188 up.

For details, write: PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Maryland.

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

PANGBORN'S 50th ANNIVERSARY, 1904-1954
For more facts circle 531 on Reply Card

BACKTALK

chanical Department, Howard Smith Paper Mills, Ltd., Cornwall, Ontario, Canada.

PLANT ENGINEERING:

"The article entitled 'Tell-Tale Instrument Checks Poor Driving, Bad Floors,' in the May, 1954 issue has come to my attention, and I feel that there may be an application for this instrument at several of our warehouses in which industrial materials handling equipment is used.

"It would be appreciated if you would have the manufacturer send us complete information concerning cost of this instrument in lots of one or two for initial testing, and cost of instrument in the event it is purchased in lots of ten, twenty and fifty. I would also be interested in seeing any brochure they may have on this equipment." *G. W. Austin, Maintenance Engineer, Gulf Atlantic Warehouse Co., Houston, Texas.*

▶ Additional information on this instrument will be sent to you from Mr. Willard S. Mielziner, President, The Impact-O-Graph Corp., 1900 Euclid Avenue, Cleveland 15, Ohio.—*Editors.*

Likes Construction Series

PLANT ENGINEERING:

"I have been reading the interesting articles on 'Strength of Materials' prepared by Byron A. Engelbach, and appearing in 'Construction Briefs' in your magazine.

"It occurs to me that they may have been appearing for some time back and have escaped my attention. Would you happen to have all of them in loose leaf form? If not, I would like you to tell me when the first article appeared and I will endeavor to locate it and the subsequent issues.

"Articles like these I think give added interest and makes one look forward to the next issue of your magazine." *T. J. Joyce, Vice President, The Tri-Lock Co., Pittsburgh, Pennsylvania.*

▶ The series of articles on "Construction Briefs" began with the July, 1953 issue and have appeared every other month since then. Tear sheets of the complete series are being sent to you with compliments.—*Editors.*

Tube Straightening Machine

PLANT ENGINEERING:

"In the April, 1954 issue, on page 91, you have an article on tube straightening, entitled 'Production Problems and Solutions in Tube Straightening.'

"We would appreciate it very much if you would furnish us with manufacturer's name and address of the tube straightening machine illustrated on page 91 for straightening precision tubing." *A. L. Long, Plant Superintendent, Emsco Manufacturing Co., Garland, Texas.*

▶ Your request is being forwarded to Mr. W. L. Redding, Ketchum, MacLeod and Grove, Inc., 411 Seventh Ave., Pittsburgh 19, Pa., who will see that more information is sent to you.—*Editors.*

Freon Checking Equipment

PLANT ENGINEERING:

"On page 97 of the February, 1954 issue of PLANT ENGINEERING the article 'Hotpoint's Refrigerator Plant is Engineered for Top Production' mentioned the Acme Aluminum Alloys Co.

"We would appreciate the address of this company, as we would like to write them regarding their freon checking equipment." *M. H. Cody, Technical Advisor to Works Manager, General Steel Wares, Ltd., Toronto, Canada.*

▶ Suggest you contact Mr. Robert K. Hoffman, Chief Engineer, Acme Aluminum Alloys Co., 232 North Findlay St., Dayton 3, Ohio, for additional information on this equipment.—*Editors.*

Inquiries on Quelcor

PLANT ENGINEERING:

"We would like more information regarding method of application and uses of Quelcor, as mentioned on page 100 of May, 1954 issue of PLANT ENGINEERING.

"We are interested in some sort of material to protect the hoods and duct work in our Babbitting Department against fumes containing muriatic acid." *David O. Coltrane, Plant Engineering Department, Ingersoll-Rand Co., Painted Post, New York.*

PLANT ENGINEERING:

"I have read your article in the May issue, regarding the plastic film used as a coating to prevent corrosion.

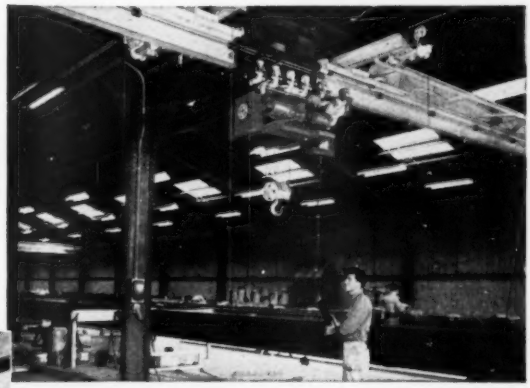
"We would appreciate having further information pertaining to this material, the application and availability. Our problem surrounds coating of exhaust duct from the Plating Department." *Dave Young, M-G-M Records, Bloomfield, N.J.*

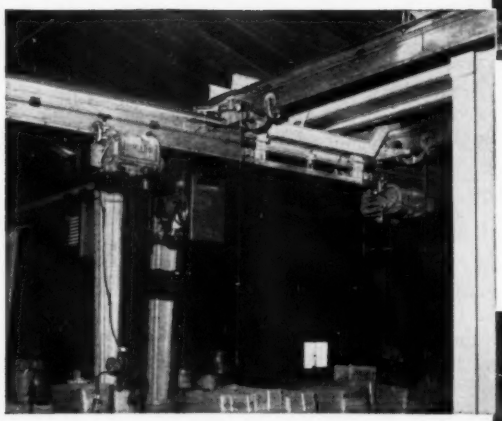
▶Your inquiries have been forwarded to Mr. L. P. Warner, Sales Manager, Quelcor, Inc., Front and Broomall Streets, Chester, Pennsylvania, who will see that information is sent to you.—*Editors.*

.....AMERICAN MONORAIL CRANES

for smooth operation at low maintenance cost use.....

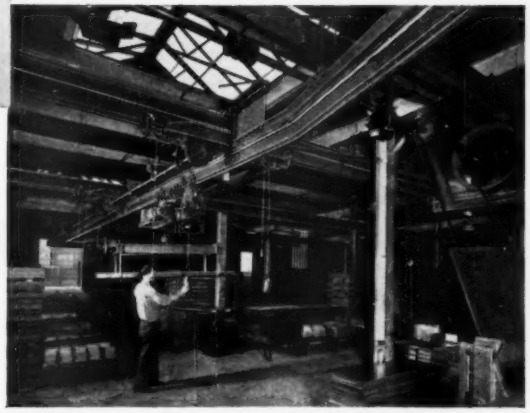
Three-ton hoist hook service extends from craneway to craneway by finger-tip controlled passage of carrier across crossover with cranes interlocked at each end.





One-ton hoist operated from crane bridge to crane bridge interlocked at crossover between craneways.

Three MonoRail cranes are interlocked to form passageway for transfer from receiving dock to steel storage area. Crane in foreground interlocks with spur track to each shear.



To handle variable loads over maximum areas, MonoRail Cranes offer smooth travel, easy movement, interlocking service between and beyond craneways, low initial cost and most important low maintenance cost. American MonoRail engineers are experienced in all phases of "up and over" handling. They are available for free consultation at your convenience.

Write for C-1 Bulletin

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13123 ATHENS AVENUE • CLEVELAND 7, OHIO

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Submerged Gas Burner For Solution Heating

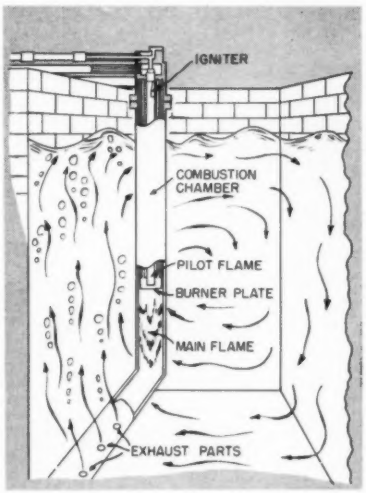
PICKLING SOLUTIONS are heated, sometimes by open jet steam, and are agitated so as to remove scale, dirt or other waste matter from metal. In the Submerged Combustion Co. process, the acid pickling solution is heated by gas in a novel way.

Compressed air forces liquid out of a submerged tube; an igniter is heated to incandescence by the passage of high amperage, low voltage current and the gas is ignited. This is followed by ignition of the main burner gas. Ratio of gas to air is automatically controlled for maximum combustion efficiency.

As the burner plate is beneath the solution level, the cooling of the combustion chamber is assured. The tubular combustion chamber conducts the heat and products of combustion to a point where they are blown out into the liquid. The heat transfer is directly from the gas to the liquid, and the products of combustion go directly into the liquid in the form of bubbles.

These bubbles set up intense agitation and circulation in the liquid which creates a scrubbing action that speeds the pickling process. By thermostatic control a temperature variance within the pickling solution is maintained within a few degrees.

In addition, the combustion unit enables the acid concentration of the solution to be kept relatively constant. The amount of water evaporated approximately equalizes the amount of acid expended in chemical combination. This will vary slightly, depending on the material and the rate at which it is pickled. Frequently, instead of acid, water is added to maintain liquid level. *From the Clark Contactor, published by the Clark Controller Company, Cleveland, Ohio.*



Schematic drawing of a submerged gas burner used in solution heating

Choose the Right Pump Materials to Handle the Liquid

SELECTING A PUMP made of the most suitable material for use with a particular liquid involves the consideration of several factors. These include temperature, contamination, concentration of liquid, corrosion and oxidation.

The table shows construction materials which may be used with some common liquids. Materials are not listed in order of their suitability. *From Viking Vacuum, published by Viking Pump Company, Cedar Falls, Iowa.*

Table lists best pump construction materials for use with several common liquids

	Materials of Construction								
	All Iron	Standard Fitted	Bronze Fitted	All Bronze	Aluminum Bronze	Ni-Resist	Stainless Steel	Monel	Nickel
Acetic Acid				X	X	X	X	X	
Alcohols		X	X	X				X	
Beet Sugar Liquors		X		X			X		
Benzene	X	X	X						
Calcium Chloride				X				X	
Citric Acid		X		X			X		
Ethylene Glycol	X			X					
Formaldehyde	X			X			X		
Fruit Juice				X			X	X	
Glue	X	X	X						
Hydrochloric Acid								X	X
Lacquer Solvents		X	X						
Molasses		X	X	X					
Nitric Acid							X		
Paints & Lacquers		X							
Sodium Chloride, Less than 3 per cent		X	X	X					
Tar	X	X							
Varnish	X	X	X						

Anti-Corrosion Rubber Lining

CRIPPLING EFFECTS of corrosion and abrasion need not eat into profits and stop production schedules. By using bonded rubber linings, failure of equipment and repair "shutdowns" due to the disintegration of metals, is being greatly reduced.

Corrosion has been successfully eliminated by the bonding of rubber to metal in special equipment projects involving waste acid disposal systems, chemical settling tanks, submarine battery compartments, ore refining operations and many other types of complex units.

The usual thickness of lining is $\frac{3}{16}$ in., a non-porous sheet capable of protecting steel against the strongest acids. Units such as tumbling barrels which contain abrasives to smooth and polish rough edges of metal parts require linings as much as ½ to one inch in thickness.

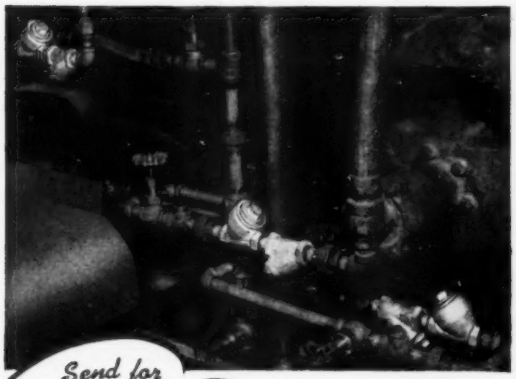
Hydraulic engineers, using steel

NICHOLSON TRAPS UP PRODUCTION at *Certain-teed* Plant

Above, Certain-teed Products Corporation's Dallas, Texas, roofing plant, where Nicholson steam traps have been adopted as standard.

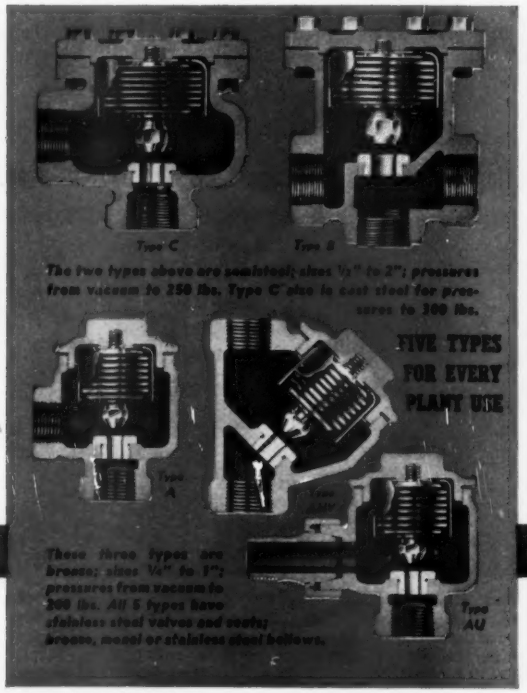
Why this modern Dallas, Tex., plant of Certain-teed Products Corporation has standardized on Nicholson steam traps may be important to you. It was because, as a plant official stated, "Nicholson traps have cut loss of steam and improved operations generally". More specifically, a recent survey showed these Nicholson features to be the reasons why leading plants are increasingly standardizing on Nicholson thermostatic traps:

(1) Two to six times average drainage capacity. (2) Operate at lower temperature differential. (3) No air binding. (4) Freeze-proof. (5) Only one moving part. (6) No need to change valves for varying pressures. (7) Record low for steam waste. Types for every process, power and heat application.



Send for
CATALOG 953
Contains installation diagrams and data for determining proper size of trap.

Nicholson traps on drying drums of asphalt saturator; Certain-teed's Dallas, Tex., plant.


Type C
Type B
The two types above are semisteel; sizes ½" to 2"; pressures from vacuum to 250 lbs. Type C also in cast steel for pressures to 300 lbs.
FIVE TYPES FOR EVERY PLANT USE
Type A
Type AU
These three types are bronze; sizes ¼" to 1"; pressures from vacuum to 300 lbs. All 5 types have stainless steel valves and seats; bronze, monel or stainless steel bellows.

W. H. NICHOLSON & CO.
TRAPS · VALVES · FLOATS
208 OREGON ST., WILKES-BARRE, PA.

Sales and Engineering Offices in 58 Principal Cities

For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 48)

pipes to clear the river bottom in the channels and shipping lanes of the Mississippi river, found that the pipes, unprotected against the sharp particles of sand, rocks and debris, were developing "sore throats" and wearing through in a short time. After rubber linings had been installed, more than 30 million cubic yards of material were sucked from the river bottom without serious pipe failure.

The rubber lining is applicable to all sizes and shapes of tanks, castings, and welded equipment. It can effectively seal against most corrosive liquids, it will not slough off, and it will not crack or buckle under alternate drying and wetting. *From a release of the Goodyear Tire & Rubber Company, Incorporated, Akron, Ohio.*

Sawing and Saving

BECAUSE OF A CHANGE in saws, an annual saving of $3,183 resulted in shipping operations at General Electric's Switchgear Dept. in Philadelphia.

Short leaf yellow pine, a wood which is particularly tough on saws because of sand and mineral inclusions, is used for crating. Green lumber is used making the cutting even more difficult.

Before switching to carbide-tipped saws, the high-speed steel swing cross-cut saw blades lasted a maximum of one day. After the replacement, saws

Carbide-tipped cross-cut saw at General Electric's Switchgear Dept. operated for a total of 86 hours without grinding

operated 240 days on exactly the same stock and application. As for the rip saw, high speed steel ran two hours, carbides ran for 86 hr before regrinding.

Stock up to 6 in. is cut on both saws. The cross-cut saw operates at 3600 rpm with a 4-hp motor. The rip-saw operates at 3600 rpm, also, but it is powered by a 20 hp motor. It has a feed of 48 fpm.

The savings figures reflect the elimination of numerous saw changes, grinding and the extended life of the carbide over the high speed steel saws. *From a release of Carboloy Dept., General Electric Co., Detroit, Mich.*

Sponge Lubricates Punch

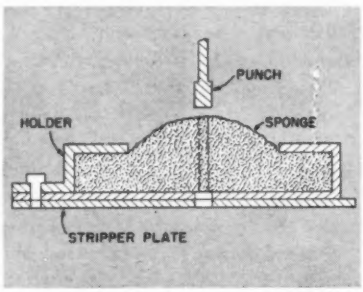
LUBRICANT application to punches and similar metal working equipment is usually done manually by brushing, wiping or spraying.

In one actual shop case where a gang punching operation was involved a novel system of lubrication was developed. The design of the gang punch made it conceivable that perhaps a sponge soaked with a lubricant could be rigged in such a way as to coat the punch prior to every stroke.

First attempts to do this failed because sponges were quickly rotted by oil. The idea was to locate a synthetic sponge. Not just any synthetic sponge would have done. The one required would have to be almost 3 ft long and 2 in. wide.

After several sponges of the required length were obtained a suitable arrangement was devised to hold this material. It was mounted on a machine in such a way that punches pass through the sponge at every stroke. In so doing they pick up a uniform film of lubricant.

Before this was done, punches had to be lubricated every two strokes and their working life was short, sometimes only two or three days. Use of Oakite lubricant without the special applicator, increased the time interval



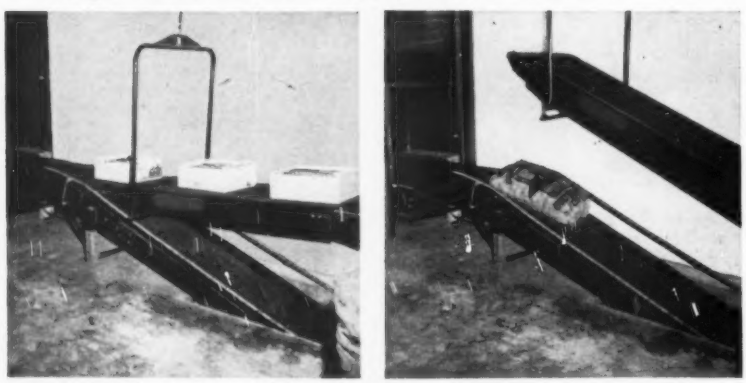
Artist's interpretation of the sponge lubrication set-up utilized for punches

between lubrications to once every 14 strokes.

After the addition of the sponge lubricator, punches took 100 strokes before oil had to be added. When more oil was necessary, it was comparatively easy to add it to the sponge rather than to have to coat each individual punch.

The shop reports that now punches are never warm to the touch and that their working life has been extended many times. *From an article in Oakite News Service, published by Oakite Products Inc., New York, N. Y.*

Lift Bridge Permits Use of One Conveyor by Two Branches



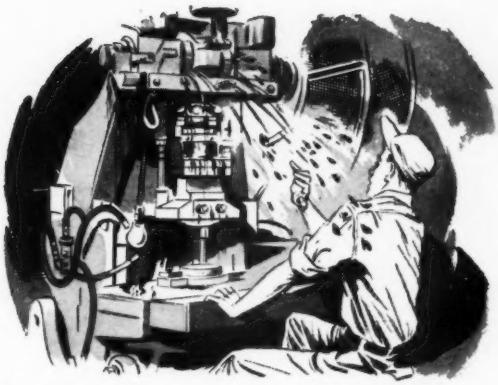
Mini-Max Provisions Incorporated of Smith Center, Kansas handles several hundred thousand pounds of produce each week. The big job of multi-story warehouse handling is done capably by an engineered conveyor system. Part of this is the lift bridge which permits handling on two levels. (From Rapid Handler, published by the Rapids-Standard Co., Inc., Grand Rapids, Michigan)

Jet Tapping of Molten Steel

AMONG THE MOST dramatic and radical changes in open hearth procedure in recent years is the switch to jet tapping.

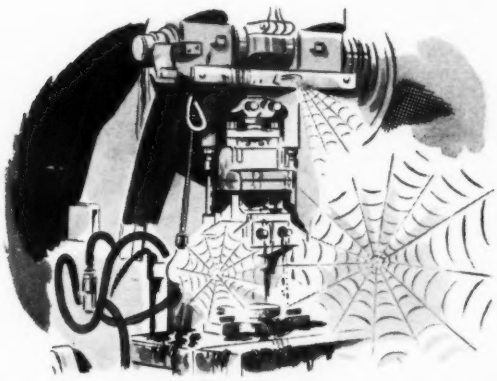
About 30 years ago, a bar and sledge were used to make an opening for tapping steel. This was a dangerous procedure, and was dropped in favor

No Downtime in Three Years After Switching to Suntac



Metalworking firm was using heavy-duty stamping presses of an older type. Bearings were wearing excessively. Oil leaked constantly—on machines, floor and operators.

Lubricant loss was so severe that bearings frequently became so hot the machines had to be shut down until the bearings cooled. This cut sharply into production.



Bearings had to be replaced on an average of once every eight months. Repairs usually took four weeks, and during this time the machines as well as the floor space were completely non-productive.

Manufacturer switched to SUNTAC because it's especially compounded to cut leakage. No breakdown now for over three years. Oil consumption reduced 50%. Also using SUNTAC to lubricate other equipment.

Do you have machines with worn, leaky bearings? Or are you losing oil through excessive throw-off from rotating or sliding parts? SUNTAC is especially compounded to reduce drip, splash and squeezeout. Its greater adhesiveness makes it cling firmly to the parts it lubricates. Get all the facts about SUNTAC from your Sun Oil representative. Or write Dept. PY-7.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

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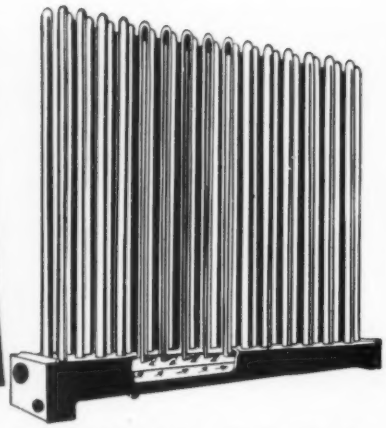
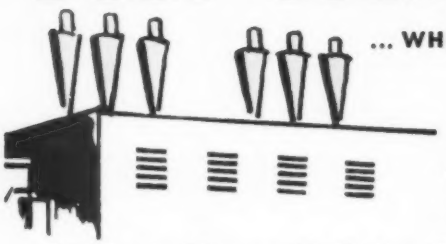
BLAST COILS



WERE NEVER INTENDED TO BE

DUST COLLECTORS



... WHEN YOU INSTALL A

Bayley

CHINOOK®

It Functions Solely As A HEATER

Unless a Blast Coil is selected of correct design for the service conditions, it may operate more like a dust collector than the industrial heater for which it is intended . . .

In contrast to conventional fin-type heaters, a "CHINOOK" Blast Coil — designed exclusively by BAYLEY — always *stays clean!*

NO CLOGGING — Impossible in a "CHINOOK" Heater, because there are no fins between which dust, lint, fibres, etc. can collect.

NO FREEZING — Safe when sub-freezing air is passing over surface.

NO TEMPERATURE STRAINS — Single-header construction permits continuous, innumerable cycles of expansion and contraction without damage.

NO SHORT-CIRCUITING — Free and positive circulation of steam, air, and water always in one direction, insures effective prime heating surface from every square foot of the coil.

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Get the Complete "CHINOOK" Heater Story — In This New 24-Page BAYLEY Catalog. Mail Coupon TODAY for Bulletin CH-532.

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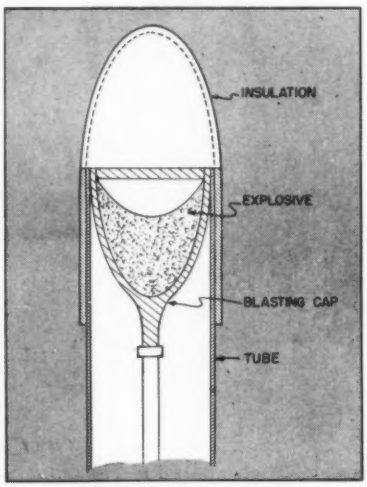
For more facts circle 535 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 48)



Cross section drawing presents general idea of the construction of jet tapper

of the oxygen lance. The introduction of the jet tapper a few years ago was the first change in more than a quarter-century.

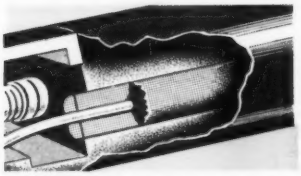
The principle is simple. A paper tube with the explosive charge on the end is placed in the runner with the charge near the open hearth tap-hole. It is then fired electrically from a distance. The molten steel gushes out immediately and flows into the waiting ladle. *From Starlight, published by Lone Star Steel Co., Lone Star, Texas.*

Multiple Tube Bending

THOUSANDS OF FEET of relatively short tube lengths must be joined together to make the fuel lines of a sin-

Five tubes, with four or five bends, can be handled on machine at one time, needing far less time than hand methods

TRENTWELD stainless tubing chosen for connecting unit of new *Sunbeam* automatic frypan



TRENTWELD stainless tubing in handle of Sunbeam frypan

Two six-inch lengths of TRENTWELD stainless tubing form an important element of this popular new automatic frypan. One tube carries the electrical connection to the heating element embedded in the pan, and the other carries the dial connections to the thermostatic control. They make a tight, waterproof seal . . . and add strength to the bakelite handle.

You'll find more and more manufacturers specifying TRENTWELD for products ranging from frypans to heat exchangers. That's because you just can't buy better tubing than TRENTWELD, no matter what the application. TRENTWELD stainless and high-alloy tubing is a product of tube mill specialists.

And when it comes to sizes and finishes, Trent provides the widest range in the industry . . . standard sizes from $\frac{1}{8}$″ to 40″ O.D. — larger sizes on special order. Next time you need tubing be sure and make it TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

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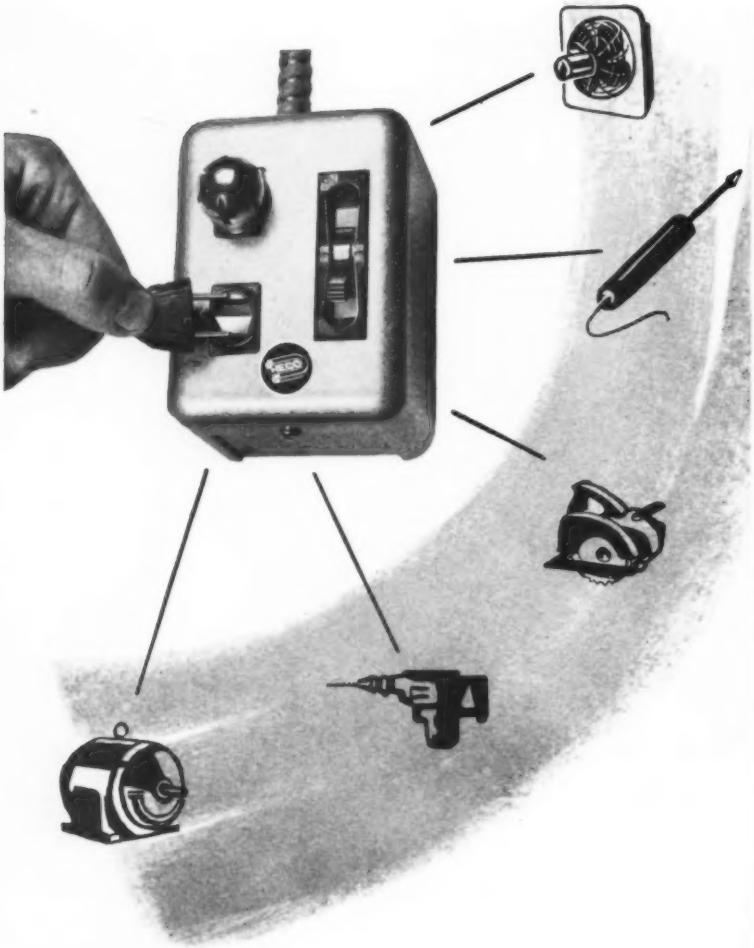


SAFELETS are *safe outlets* . . . for on-the-spot overload protection

Wherever electrical appliances or power tools are used . . . wherever the danger of overloading exists . . . there's need for a *Safelet*.

A unique individual protection station, the *Safelet* is another practical application of the Heinemann Circuit Breaker. It interrupts short circuits or large overloads instantly, yet allows normal inrush or harmless overloads. The circuit breaker is combined with a convenience outlet in an attractively styled metal wall-box.

Safelets protect either the branch circuit wiring or equipment plugged into the line. They are available in ratings up to 15 amperes, and, for protection of fractional horsepower motors, in ratings up to 1 hp. An optional feature is a pilot light which shows when the circuit is in use. Several types of female receptacles are available.

Safelets are safe outlets for power tools, soldering irons, exhaust fans, oil burners, air conditioners and miscellaneous small appliances. Installed in your plant, they can save many hours of down time, many dollars in equipment repair and replacement costs.

For details, write for Bulletin 1010.

HEINEMANN ELECTRIC COMPANY
128 Plus Street • Trenton 2, New Jersey

HEINEMANN Circuit breakers

For more facts circle 537 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 48)

gle rocket engine. To beat the problem of multiple fabrication of tubes, Bell Aircraft Corporation personnel devised a tool which cuts production time on a single component by several hundred per cent.

With the new set-up five tubes, each with four or five bends, can be handled simultaneously and tolerances of 0.0005 in. can be held. Some of the tubes are ¼ in. dia or less, while others are as large as one inch. *From Bell Aircraft News, published by the Bell Aircraft Corp., Buffalo, N. Y.*

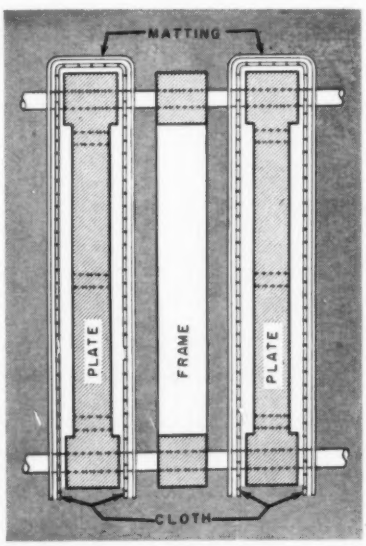
Filter Press Plate Dressing

NEW METHOD of dressing filter press plates to reduce leakage and prevent rim-cutting of the cloth has been developed by Flaherty Filter Fabrics, Irvington, N. J.

Each plate in a plate-and-frame filter press is dressed first with a Dynel fabric of the required porosity. Over each fabric is then placed a Dynel mat.

When the plates and frames are then brought together, the matting acts as efficient gasket for each frame and it cushions the cloth to reduce and prevent rimcutting. In addition, because there is no leakage, full operating pressure can be built up quickly, without waiting for cake build-up.

This type of matting has been used successfully on both wooden and metal presses. On some metal presses it has been found that matting can be used



Section shows use of cloth and mat in dressing wooden plate-and-frame press

as a single layer, without fabric, to minimize bulking.

It is reported that this method of dressing filters produces two direct economies. One cloth and mat are less expensive than two cloths, and time to get a press back in operation after cleaning or redressing is reduced to a minimum. *From a release of Textile Fibers Dept., Carbide and Carbon Chemicals Co., Div. of UCC, New York, New York.*

Irrigation by Automatic Control

Designer of an automatic irrigation system demonstrates this working model

AN AUTOMATIC IRRIGATION control that closes the head gate of the reservoir as soon as the desired amount of water has been released, has been perfected by Ike Jenkins, senior engineer.

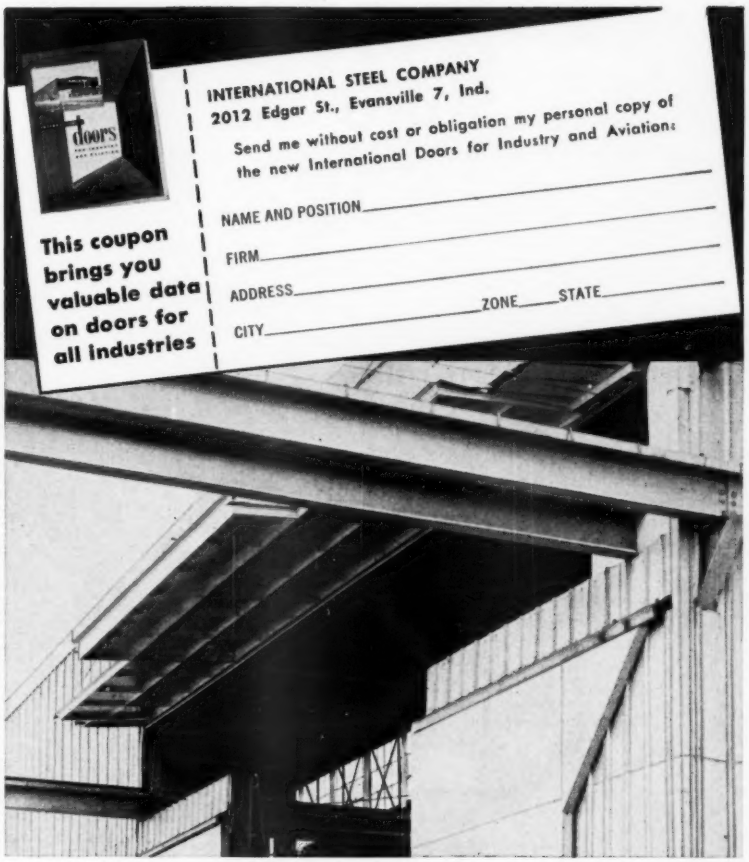
Actual depth of the water allowed to flow onto the land being irrigated is controlled by two brass screws on an insulated strip, which is set upright on the ground.

When water touches both of the screws, an electric current energizes a super-sensitive relay. This relay in turn activates an electric solenoid which drops the head gate, shutting off the water flow. The control circuit operates on 24 v.

Spacing of the screws on the control strip determines the depth of the water. An alarm system gives warning in the event that any part of the system fails to operate. *From Spark and Flame, published by Arizona Public Service Company, Phoenix, Ariz.*

System Detects Hot Bearings

AN AUTOMATIC electronic temperature-monitoring system designed to prevent major breakdowns of printing presses due to overheated bearing and gear housings has been successfully developed by *Popular Mechanics.* The new system, described as the first designed for the printing industry, constantly monitors bearing temperatures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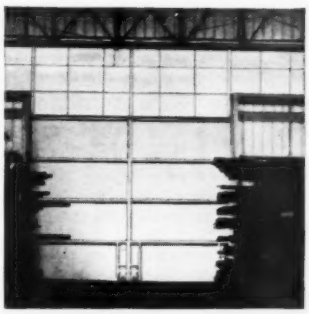

Interior view of International Crane Door installation, built for steel warehouse service.

THIS KING-SIZE MOTORIZED CRANE DOOR — with an over-all area of 350 square feet and each square foot weighing a full 100 pounds — is the kind of project that can be a problem without the benefit of experienced planning help. In this case, the big 17½-ton crane door was completely engineered as well as fabricated by International Steel.

In all cases, International's all-inclusive service . . . from sitting in at the planning stage to actual fabrication and erection . . . is yours to use, any time and any part, in speeding any industrial door problem to a profitable solution. International's experience is all-inclusive, too — covering every type of door for in-plant or outside applications. You'll find this confirmed in the valuable handbook offered in the coupon above. Send for your personal copy *today*.

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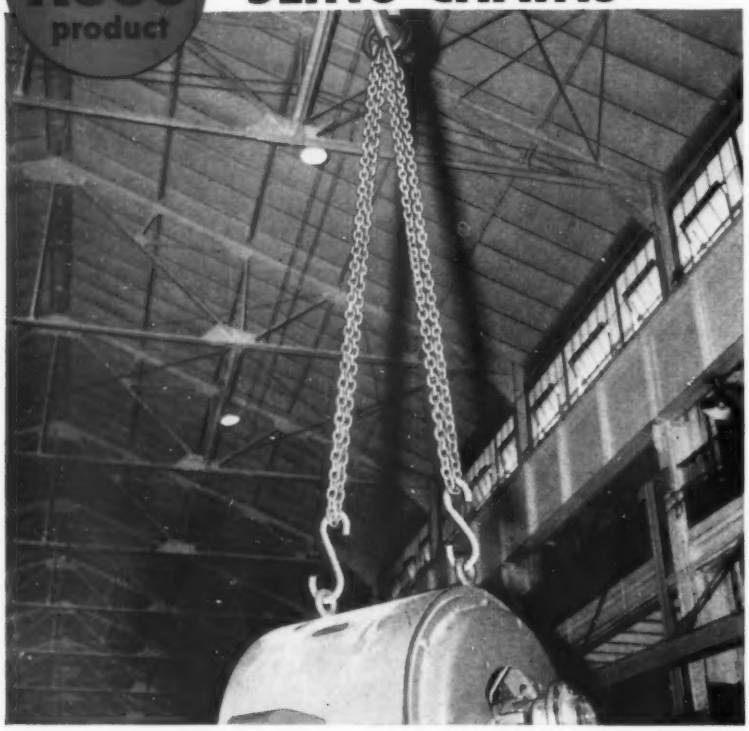

You get more than chain when you buy ACCO Registered Sling Chains

• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered*.

ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 48)

in 48 critical locations on two presses.

Heart of the arrangement is a central control panel located near the center of each press. Here each of three electronic strip chart recorders measure and chart the temperature output of 16 thermocouples. These thermocouples, or temperature-sensing elements, are imbedded on the bearing and gear housings.

If either of the recorders detects an unsafe temperature, a cam on its main drive gear trips a mercury switch that sets off a warning horn. At the same time, a red light glows. The horn can be shut off by pressing an alarm silencing relay but the light will glow until the temperature returns to normal. The printer, studying the instrument chart, can easily spot the overheated area and make the necessary adjustments.

It is also believed that the chart records will serve as a primary guide for preventive maintenance. Any change in a single temperature point that is not consistent with normal fluctuations of the other points in its group becomes a warning of wear. *From a release for the Minneapolis-Honeywell Regulator Company, Philadelphia, Pennsylvania.*

Battery Care

THE SIMPLEST WAY to keep cycle-duty batteries at maximum efficiency is to establish a periodic maintenance and inspection schedule. The battery should be cleaned from once a day to once in several weeks, depending upon the atmospheric and other conditions under which it operates.

The specific gravity and voltage of each cell of the battery should be checked at least once every three months, preferably once a month, after an equalizing charge.

Records of all charging and maintenance activities for cycle-duty batteries should be made and filed to form a case history of the battery. Identify each battery and truck by number.

Such records show which batteries are being abused or are wearing out, and make it possible to take steps to correct abuses or replace units in time to prevent production stoppages. From these records, troubles in operating equipment, charging equipment, and charging schedules often can be diagnosed.

Considerable savings can be made in over-all plant operation if charging stations are located strategically.

In large plants, it can be advantageous to situate small charging stations in outlying departments.

If central charging is used, the charging station should be situated so that all trucks have approximately equal distance to travel for charging Central charging has the advantage that it is more easily supervised. If conditions call for spot charging, proper supervision is important.

It is particularly advantageous to schedule charging operations where a large fleet of trucks is employed, or where more than one shift is worked. By assigning each truck a certain time to report for charging, a backlog will not pile up at the charging room and truck downtime will be minimized.

Although charging equipment is today largely automatic, it must be correctly set for the size of the battery charged. If a voltage relay timer governs the charging period, it should be inspected frequently to be sure it is in good operating order.

If the ampere-hr method of controlling the charge is used, charging men must be thoroughly familiar with ampere-hr charts and utilize them correctly. Otherwise, the battery will be overcharged or undercharged.

Batteries that are stored for a period of time should be given a freshening charge once every three months to keep them in fully charged condition.

Efficiency drops rapidly after a cycle-duty battery has been in service so long that it delivers less than 85 per cent of its rated capacity. When this point has been reached, it is advisable to replace the battery, to prevent work stoppages, avoid extra charging operations and wasted power. *From an article by K. A. Vaughan of Gould National Batteries, Inc., Trenton, N. J.*

Protractor Promotes Pipe Cutting Accuracy

WELDERS at the Temco Aircraft Corporation plant in Dallas, Texas had found it difficult to hold accuracy when making lengthwise cuts on long pieces of pipe. They could establish a centerline mark on one end of the pipe. But when they tried to mark a similar point at the pipe's other end, they had no means to insure that the two points, connected, would provide a straight line.

So, one of the employees found the answer at a cost of only $5. Basically, the tool that Charles Gonday designed is an aluminum V-block, 4½ in. wide.

A 10-cent protractor is mounted on a plate attached at one end of the V-block. A movable metal pointer is fixed so that it sweeps across the face of the protractor, and a 2½ in. bubble

an ACCO product

ACCO Registered* WIRE ROPE SLINGS

A STANDARD OF QUALITY

●"ACCO *Registered*" is the registered trademark applied by American Chain and Cable Company to slings of the highest grade, but it is more than just a trademark.

"ACCO *Registered*" is a definite specification of quality in both material and design.

To be "ACCO *Registered*," a wire rope sling must meet the following specifications:

1. It must be made from high strength "Green Strand" wire rope.
2. All parts of the finished sling must have a breaking strength equal to the catalog strength of the sling body.
3. All fittings and attachments must withstand a proof-test equal to at least two times the rated capacity without permanent distortion.
4. Actual field service tests of each design.

As evidence of compliance with these requirements each sling is given a metal identification tag and is accompanied by a Certificate of Proof Test and Registry.

What does ACCO REGISTRY mean to you?

It means that you can equip your shop with "lifting tools" and be confident that their designs and materials are specifically selected for the highest efficiency by trained engineers who spend all their time on slings.

It means that you can be sure that your men, materials, and machines are given the highest protection against injury during lifting operations.

Where can you get ACCO REGISTERED SLINGS?

To make ACCO *Registered* Slings immediately available for your requirements, American Chain and Cable Company, Inc. has appointed one of the best industrial supply houses in your community as an ACCO *Registered* Sling distributor. Selection for such appointment is made on the basis of the distributor's desire to serve you, his grasp of your problems, and his willingness to maintain in his stock sizes and types of slings you need.

See your ACCO *Registered* Distributor or write to us for literature and his name.

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plus Links Shackles Hooks

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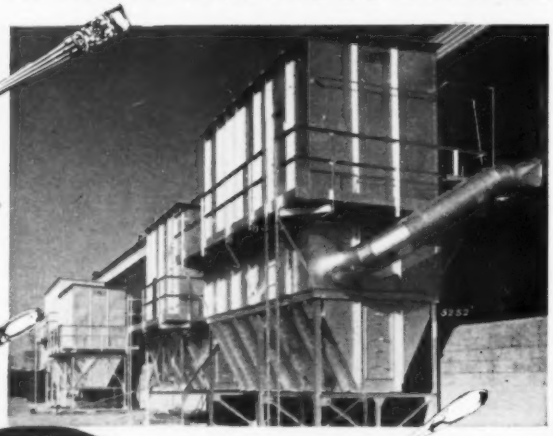
SLY PIONEERS & LEADERS in INDUSTRIAL DUST CONTROL



Sly Dust Filters at Oneida Ltd. The six filters handle 150,000 cfm.

Dust source — buffing and polishing machines — and ducts leading to filters.

$600 WORTH of SILVER *Recovered* EVERY DAY

Producers of "not ordinary silverware —but genuine Community, beloved by brides and their mothers for generations", Oneida Ltd. knows the value of dust collection . . . not ordinary dust collection—but Sly, pride of progressive industry for half a century.

In Oneida's modern plant, Sly Dust Filters collect all the dust from buffing and polishing operations. The silver dust is whirled through ducts to the filters and the silver reclaimed. This averages $600 worth of silver per day.

Regardless of what you make, if you have a dust problem, our long experience in collecting all kinds of dust can be of value to you in cleaning up the plant and effecting savings *—which frequently repay, in a relatively short time, the cost of the equipment.*

Expertly designed and built, Sly Dust Filters offer many advantages in greater filtering capacity, easier bag replacement, automatic control, and other features which spell low cost operation.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 48)

is mounted so that it moves with the pointer. A punch is inserted at the point of the V, aligning with the 90-deg point on the protractor.

To establish a center line on horizontal pipe, the V-block is placed on one end of the pipe. The pointer is set at 90 deg on the protractor, and the block is adjusted until the bubble is centered. A tap on the punch marks one end of the centerline on the pipe.

This operation is repeated at the other end of the pipe; then the points are connected with a straight-edge, if

Welder demonstrates tool he designed to help in linear pipe sectioning job

the pipe is short. A chalk line is snapped, if the pipe is long.

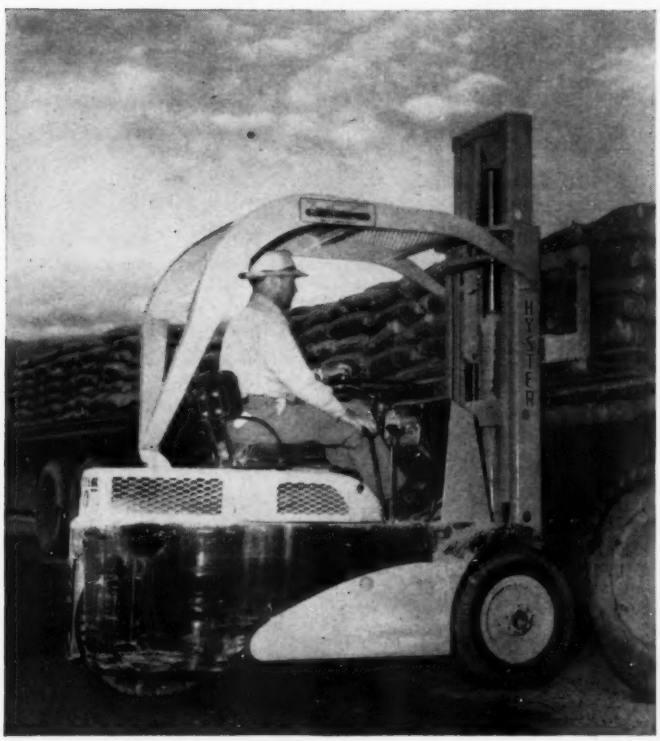
If a quarter-section of the pipe is to be removed lengthwise, the line that has been drawn is used as one guide line. To get the other line, the pointer on the V-block is moved to zero or 180 deg on the protractor. Then the block is slid around the curve of the pipe until the bubble is again centered and the punch is tapped.

This procedure, repeated at the other end of the pipe, provides the two terminal points for the second guide line. The lines are exactly 90 deg, or one quarter of the pipe's circumference apart. The same procedure is used to halve or otherwise section pipe lengthwise.

In addition to providing accuracy in pipe sectioning layout, the device is used to position pads on jigs made of pipe. On the average the block saves about ¾ manhr per shift. *From a release of Temco Aircraft Corporation, Dallas, Texas.*

B.F.Goodrich

FREE TW TIRE AND WHEEL ANALYSIS eliminates tire waste, cuts costs 20-50%



THE money-saving B. F. Goodrich Tire and Wheel Analysis Plan attacks excessive tire costs by uncovering the *reasons* behind tire waste. What causes premature tire failure? Rapid tread wear? Cutting and chipping? The TW Analysis answers all of these questions and many more. This free analysis has cut tire costs 20 to 50% for hundreds of industrial tire users across the country. It can do the same for you!

Contact your BFG retailer or mail the coupon below. Without cost or obligation, a trained B. F. Goodrich man will study your materials handling operations. He will tell you what type and size tire, what tread design and compound will serve you best. He will recommend ways to improve your tire maintenance program. The advice you receive will be unbiased, for B. F. Goodrich makes a *complete* line of industrial tires—solids, pneumatics and semi-pneumatics. A special TW Analysis is available for manufacturers of industrial hauling equipment.

Outside operations? Hauling over rough surfaces can soon ruin good tires not suited to that type of service. The TW Analysis helps you select the right tire for every job.

Tire failures like this cost money! This tire failed prematurely. BFG's TW Analysis helps you discover the reasons for tire failure, prevents reoccurrences, saves you tire dollars.

Heavy loads? Overloaded tires fail prematurely, usually cannot be repaired. Let the BFG man show you how to match tire and load for maximum service at lowest cost.

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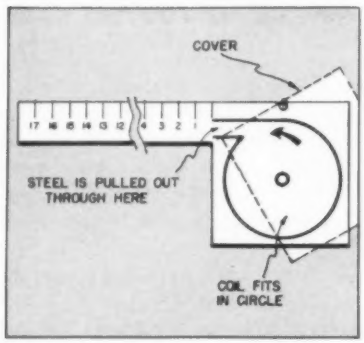
OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Band Saw Steel Dispenser

Contributed by Roman Brezinski, Allis-Chalmers Manufacturing Co.



Holder for coil of band saw steel facilitates measuring and cutting of lengths

DISPENSING various lengths of band saw steel from 100-ft coils has been expedited with the development of a shop-built holder for the supply coil.

The coil head of the holder has a swivel cover that fits over the coil, and the band saw steel is drawn out along a board calibrated from 1 to 17 ft, on which the desired lengths can be easily measured and cut. As an added feature, the holder also prevents the band saw steel unwinding and springing around loosely while it is being cut.

Heat Escape Hatch

EXCESS HEAT in second floor manufacturing areas at Standard Pressed Steel Co., Jenkintown, Pa., is vented off during cold weather months and the temperature lowered as much as 15 F, by raising individual louvers in roof-top ventilators.

Accumulated heat was a greater problem in the plant during winter months than during the summer. When the weather is warm, the 50-in. fans in the plant's 11 roof ventilators will quickly dissipate heat. Use of the fans on cold days, however, wasted heat elsewhere in the plant and increased fuel expenses.

Individual louvers in roof-top ventilators dissipate heat in plant hot spots

The roof ventilating equipment had no provision to allow heat to escape without operating the fan, so Morris White, general foreman of maintenance, tackled the problem and designed a louver-raising device.

The equipment consists of two semicircular louvers controlled by chains running through pulleys attached to brackets. The chains are run through a ¾-in. pipe from the roof to the second floor. Here, they are attached to a handle approximately six feet above floor level.

When the temperature becomes uncomfortably high in any area of the plant, the louvers in the roof ventilator directly above are opened, thus lowering the temperature. The chains can be held in place anywhere along their length by means of hooks.

It was found necessary to equip only four of the 11 roof ventilators with the louver-raising equipment in order to control temperature build-up. Ventilators thus equipped are over areas where there is greatest heat accumulation.

Crane, Plus Dollies, Simplifies Steel Movement

IN THE COURSE OF MOVING steel sheets at the Westinghouse Electric Corporation Appliance Division, Columbus, Ohio, a 90-deg change of direction and a change in floor level is necessary. This is accomplished by the use of cranes and dollies.

The steel sheets are brought into a high bay area of the plant on a bridge crane. Crane rails extend a short distance over the mezzanine floor at the end of the bay.

The crane picks up the steel lifts, deposits them on the dollies on the mezzanine floor. Running on rails, these dollies carry steel to another bay, at right angles to the first one, where a floor-controlled crane lifts the steel and carries it away for further fabrication processes.

Cranes, and dollies on rails, are teamed for easy handling of these steel sheets

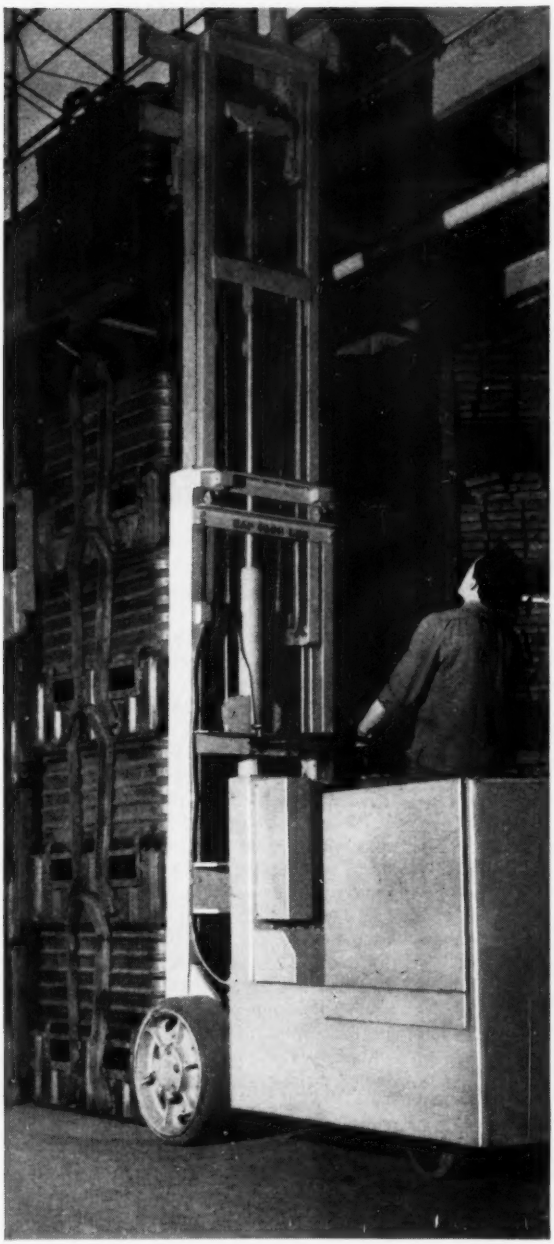
Selenium Rectifier Maintenance

Contributed by L. W. Fitzpatrick

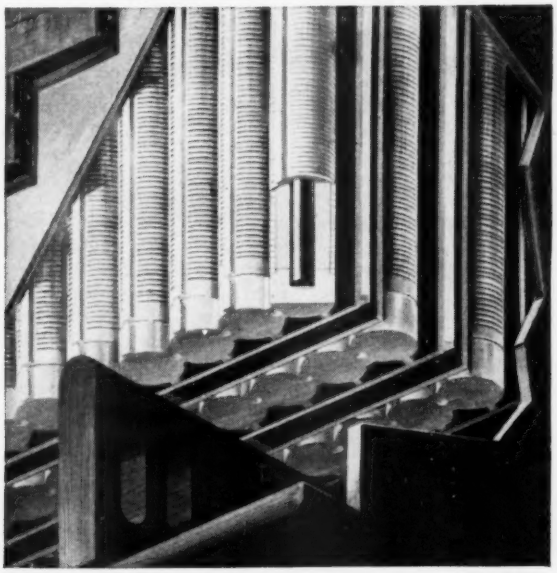
EVERY SELENIUM RECTIFIER should be checked monthly for best service. A rapid check with a high-range ohmmeter for d-c resistance should be made in one direction, then with reverse leads, to obtain two resistance

GET "FINGER-TIP" CONTROL, MORE LIFTS PER SHIFT

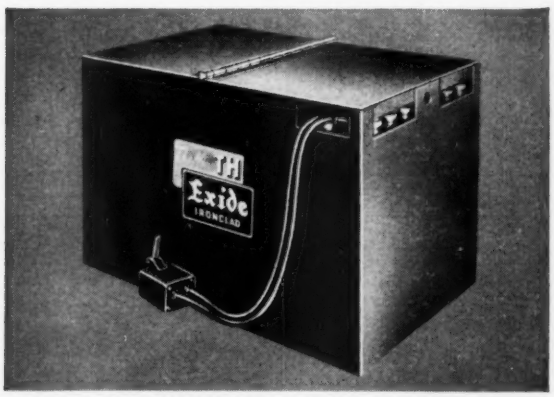
. . . with low cost Exide-Ironclad battery power!



ACCURATE STACKING, precise spotting, are essential for fast, safe materials handling. Exide-Ironclad Batteries respond instantly to any power need required for rapid, accurate handling operations. They enable trucks to handle as much load in the last hour of the shift as during the first . . . with no unscheduled down time. Lower costs for operation, maintenance, and depreciation make Exide-Ironclads the best power buy—AT ANY PRICE.



THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power.* Also, more active material is retained, *giving longer working life.*



THE NEW THRIFTY HAULER! The improved industrial truck battery. *Non-oxidizing* plastic power tubes assure longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy
. . . AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 60)

values. Good rectifiers will show almost infinity in one direction and less than 100 ohms in the other.

Rectifier temperatures should never exceed 95 F. Check for over-voltage in excess of maximum rating which can overheat the unit.

Past overheating will be shown by small solder beads on disc undersides. Rough blemishes like blisters near pressure washers and on the selenium coatings will show places where selenium has shorted through. "Smell" test will rapidly indicate where the selenium has been damaged, because a pungent gas is liberated by heat.

Check volt-ampere efficiency with a-c wattmeter. Efficiency should be between 65 and 85 per cent, depending on the circuit. Load curve should be flat from 20 to 85 per cent.

Single phase selenium units to capacitor or battery load are usually derated about 20 per cent for high rectifier current against average current value.

Aging increases rectifier resistance, reducing d-c voltage output from 5 to 10 per cent, depending on service. Rectifier transformers usually have taps to increase "raw" alternating current. The aging effect also lowers efficiency.

New units connected to aged stacks may cause current and voltage unbalance, because forward and inverse resistances are different.

Check for corrosive fumes which can cause trouble. Check for mechanical damage and abuse. Check for support or frame grounds. Test each terminal to ground. Excessive dirt and moisture can cause lowered resistance in stacks and produce short circuits.

If a selenium rectifier has been idle for a long period or operated at low inverse voltage, inverse resistance decreases, and when full current is applied, the inverse current will be abnormally high for several minutes until normal resistance returns. When returning to service, voltage should be applied gradually.

Units designed for intermittent service should not operate continuously.

Positioner for Cylindrical Work

Contributed by C. H. Willey

FOR HANDLING large cylindrical work at a drill press or in a welding area, a fixture can be made from an I-beam (cut lengthwise) or a length of T-Beam and two lengths of bar stock, notched at each end. Allen set screws, which protrude into the notch,

(Continued on page 64)

Fabricated Machinery Transporter for Small Plant Handling is Flexible, Strong, and Maneuverable

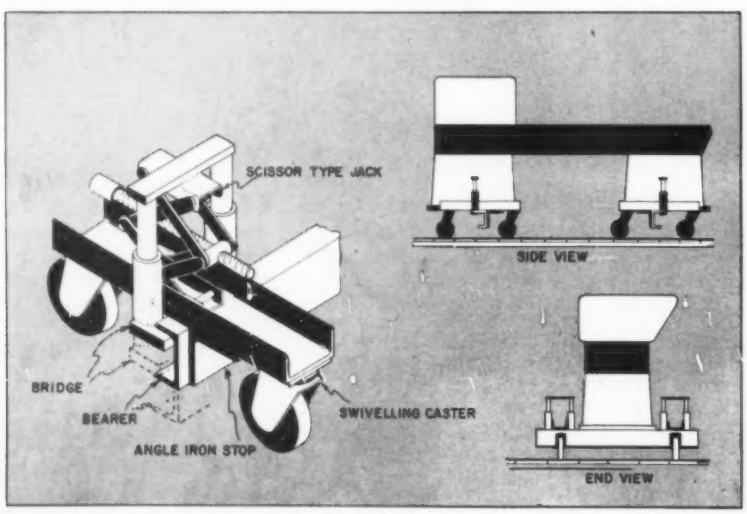
Contributed by F. E. Riley

MOVEMENT OF MACHINES weighing several tons is always a problem in small plants not equipped with overhead cranes. Unfortunately, it is often necessary to rearrange machines.

A machinery transporting rig which is readily adjustable to suit any size machine, and which occupies little storage space, can be constructed as shown in the drawing.

In use, each end of the machine being moved rests on a bearer—a length of channel. Bogy units, each of which has two wheels, are attached to the ends of each bearer. Therefore, with four bogy units under the load, eight wheels are in contact with the floor, providing relatively easy transportation over rough surfaces.

To mount a machine on the transporter, one of the bearers is slid under each end, using crowbars and jacking blocks. With the machine resting on the bearers, still supported on the floor, bogy units can be attached to the bearers. Using the lifting jacks incorporated in the unit, the load and bearers can be lifted clear of the floor and locked into place. Machine and transporter thus become integral.



Isometric view at left shows construction of bogy unit. Views at right show positions of bogy units on machine, looking from side and end of machine

The bogy unit consists of a "strongback" of 4-in. structural channel, with a pair of ball bearing swivel casters at each end. A scissors-type jack, modified by removing its bottom plate and replacing its top plate with a bridge piece, is welded to the inside of the channel strongback. Projecting down from the bridge are tubular vertical guides which pass through guide tubes welded to each side of the bogy strongback. The bridge and vertical guides take all the side strain away from the jack, so that the effort of the jack is concentrated vertically.

To engage the bogy unit with the bearer under the load, the jack is fully lowered. The bogy unit is then moved so that the lower bridge can hook under the upper leg of the channel bearer. With two units in place on a bearer, jacking screws will raise the lower bridge, carrying with it the bearer and the load. The bridge is raised until the upper face of the bearer makes contact with the under side of the strongback, where it is locked into position against an angle-iron stop welded to the strongback.

The machine, resting on the bearers which are now supported on the bogy units, is now ready for transporting. For moving machines over considerable distances, the front and rear bearers can be linked together and a towing arm supplied for attachment to a towing tractor. In new machinery installations, the transporter functions as a precision jack, for lowering the machine onto foundation bolts.

LET'S START WITH THE CAUSES OF *DERMATITIS*

Costly dermatitis can be prevented. By getting at the basic causes. We can help you by analyzing the work your employees do, checking for hazards our experience tells us might cause dermatitis. We'll check the care given their hands. Then we'll compare your present protective treatments with the skin care methods we've found to be best during our many years of controlling industrial dermatitis.

Where it is necessary, we offer consultation with specialists. Complete chemical and bacteriological analysis.

After these preliminaries we can help you set up a *continuing program* for dermatitis control. Provide leaflets and posters to help educate employees. Assist you in choosing the particular products from West's broad line that will best apply to your situation. At the right are a few examples.

Let's see how WEST products control dermatitis

West's complete line of sanitation products includes hand cleaners, protective creams, antiseptic soaps and protective garments. Everything you need for effective control of dermatitis. Here are a few of them.

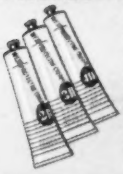
LAN-O-KLEEN

is a heavy duty powdered hand cleaner. Contains a relatively high percentage of "free" lanolin, the emollient lecithin, soap, and balanced alkalis blended together by a secret process in a fine corn meal base. Provides both super-fatting and effective cleaning.

ANTISEPTIC SULPHO HAND CLEANER

contains bacteriostatic properties. Will not defat the skin. Excellent skin cleaner even for sensitive hands. Offers protection against many harsh chemicals and other materials used by people in industry and institutions.

ANTISEPTIC PROTECTIVE CREAMS



contain bacteriostatic properties. Formulated to provide protection against almost every occupational hazard. Used by thousands of workers throughout the United States and in Canada.

WANT DETAILS?

Tear out this coupon and mail with your letterhead

Dept. 52

I'm interested in:

☐ A FREE booklet packed with information on dermatitis and helpful tips on skin care.

☐ A talk with a West specialist about my dermatitis problem. No sales pitch. No obligation. Just discussion, a look at samples, and a demonstration if I want it.

WEST DISINFECTING Company

West's broad line of products includes not only cleaners, soaps, and protective creams but also washroom service . . . disinfectants . . . deodorants . . . insecticides . . . floor maintenance materials. West is also the exclusive distributor of Kotex Sanitary Napkins sold through vending machines.

42-16 West Street, Long Island City 1, N. Y.

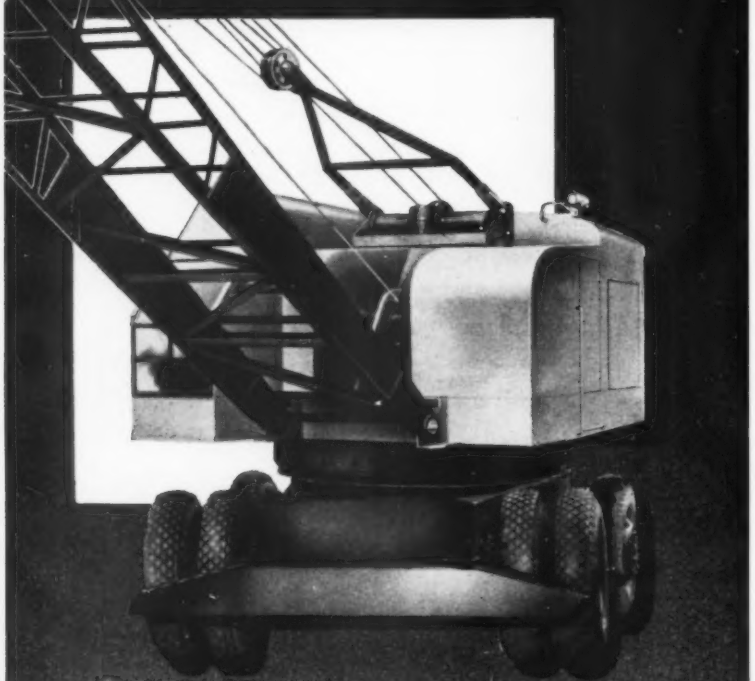
For more facts circle 544 on Reply Card

ORTON

Torque-Control*

AERO-CRANES

Pneumatic tires cushion shock on travel mechanism—far less maintenance!



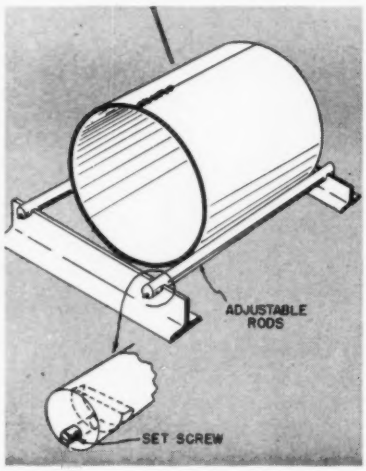
* TORQUE-CONTROL MEANS
CONTROLLED POWER!
—exactly enough for each load! no more, no less

ORTON CRANE AND SHOVEL CO.
608 S. DEARBORN ST., CHICAGO 5, ILLINOIS

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 60)



Positioning of cylindrical work piece for welding is simplified by using a jig

anchor the rods in any desired position on the I-beams.

Easy disassembly permits compact storage of the jig, knocked down to its component parts.

Exhaust Piping Hints

PROPERLY PLANNED and correctly installed dust control systems are necessary in many industrial plants. The following suggestions, advanced by W. O. Vedder, Pangborn Corp., Hagerstown, Md., are general specifications for average duty industrial exhaust system piping.

Keep bottom of pipe straight throughout its entire length to avoid dirt-collecting pockets. Make changes in area with gradual taper on the top and sides only.

Make branch connections only into side or top of tapered section of main pipe. Angle should not exceed 45 deg, and preferably be 30 deg. Branch connections should enter near large end of the tapered section.

Lap joints in direction of air flow. Keep piping free of obstructions.

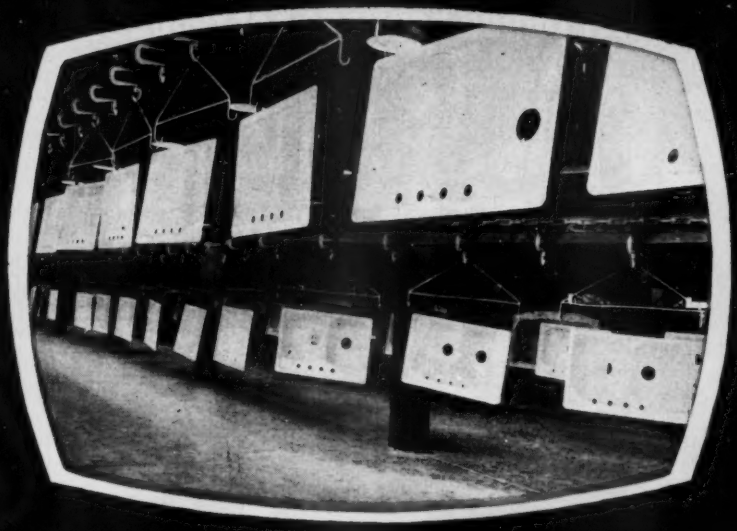
Piping should be substantially supported throughout its length by strap iron, angle or rod hangers.

Provide cleanout openings in lower side of pipe at regular intervals and adjacent to bends, junctions, vertical risers, etc. Provide end cleanouts with removable caps.

Elbows and bends should be formed with smooth curves having a center line radius equal to twice the pipe diameter and be constructed two gages

For more facts circle 546 on Reply Card ——→

telling the story of 'dag' dispersions



Are You Getting Proper Results From Your Present Lubricant?

Does your present lubricant adhere to, and become an integral part of, all friction surfaces that move in high temperature? Does it possess almost unlimited durability? Does it provide protection at extreme temperatures to such things as bearings of kiln-car wheels, to oven conveyors, and other devices and appliances which are exposed to burning heat or freezing cold?

If your present lubricant cannot fulfill these varied requirements, then consider one which does: **'dag'** Colloidal Graphite, the ideal *dry-film lubricant.*

Dispersions of **'dag'** Colloidal Graphite in oils, water, volatile hydrocarbons, and resin-solvent combinations give you slick, durable, dry lubricating films. Applied by spraying, painting, or dipping, they won't gum up or break down *at any temperature you are likely to encounter.*

Learn how this versatile lubricant can help you. Write *today* for Bulletins **No. 424-GO and No. 435-GO.**

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS

Acheson Colloids Company, Port Huron, Mich.

... also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try 'dag' resin-bonded dry films for permanent lubrication

GOOD FOR 750° F.
—yet water cooled bearings not required

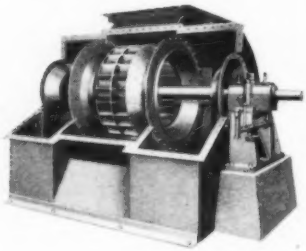
SAFETY GUARD
protects cooling wheel.
COOLING AIR DUCT
guides air flow and intercepts radiant heat.
COOLING FAN
mounted on fan shaft — circulates air and reduces fan interior temperatures. Dependable, inexpensive.

A Less Expensive, More Simple Way of Handling Hot Gases

When you need industrial fans for handling high temperature air or other gases — remember CLARAGE AIR COOLED BEARINGS for jobs up to 750° F.

Air cooled bearings are factory installed on Clarage industrial fans in a wide range of types and sizes. They are thoroughly reliable, and compared with water cooled bearings effect a decided economy in total installation cost.

Many money-saving features are engineered into Clarage industrial fan equipment. You cannot do better than take advantage of our 40-year experience.



FOR ABOVE 750° F.

For air handling at temperatures ABOVE 750° F., Clarage recommends the Type RT fans shown above. Extra heavy steel housings, welded wheels, shafts of liberal size and water cooled bearings of superior design insure long time operation.

CLARAGE FAN COMPANY, Kalamazoo, Mich.

You can Rely on... CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 60)

heavier than straight pipes of corresponding diameter.

Blast gates for system resistance adjustment should be located in branches close to their junction with main pipe and be provided with means for locking in adjustment.

Construct piping of galvanized steel with riveted and soldered or lock seam joints; or black steel with welded joints, of the following gages: 4- to 12-in. diameter, 20 gage; 12- to 32-in. diameter, 18 gage; 32-in. diameter and over, 16 gage.

Stand Facilitates Titration

Accurately detecting pale end point in titration of quality-controlled solution is made easy at the Trane Co., La Crosse, Wis., by titrating in white-painted stand

Press Operator's Magnetic Helper

SIGNIFICANT SAVINGS in labor costs and almost complete elimination of injuries have been realized in the punch press department of Cutler Hammer, Inc., electrical manufacturers, since the installation of magnetic separators, manufactured by Basco Mfg. Co., Inc.

The separator employs a magnetic principle, inducing a magnetic field among the stacked sheets at a punch press feeding station. The sheets tend to repel each other, and the ends fan out, leaving space between each sheet and the one beneath it.

As the operator lifts the top sheet in the stack, to insert it into the press, action of the separator raises the next sheet into lifting position. Prior to the use of the separator, a sharp metal instrument was used to separate the sheets, with frequent hand injuries a consequence. The separator has re-

For more facts circle 548 on Reply Card →

Take The Guesswork Out Of AIR POWER

WAYNE *Job-Engineered* COMPRESSORS

. . . are matched *exactly* to your plant requirements and to each individual job. What compressed air capacity do you need today? . . . in the near furture? How much air power do you need for each machine? . . . for *all* your machines in full operation?

Wayne prescribes the right Job-Engineered Air Compressor for your specific needs and gives you not a theoretical displacement rating but a *guaranteed*, full-rated usable air output on which to base your planning and operation without guesswork.

Wayne Job-Engineered Air Compressors are built for—

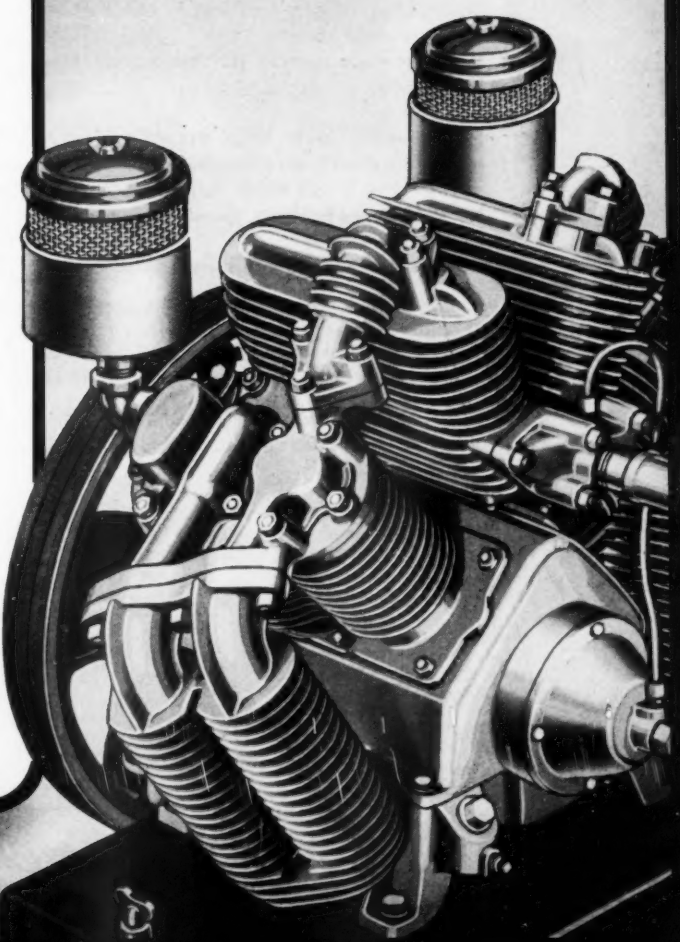
HIGH EFFICIENCY:
- Dual intake valves in low-pressure cylinder
- Positive constant-level lubrication
- Dual moisture extractors

POWER ECONOMY:
- Lightweight automotive-type pistons
- Extra cooling capacity through greater cooling surface, large flywheel-fan
- Fully automatic controls

EASY SERVICING:
- Four-piece unit construction
- Easy-to-clean filter and muffler
- Accessible drain-cock

Write today for data on "How to Choose an Air Compressor."

THE WAYNE PUMP COMPANY
SALISBURY, MARYLAND • TORONTO, CANADA



Wayne

NATION WIDE SERVICE

LIFTS HOSE REELS LUBRICANT DISPENSERS INDUSTRIAL PUMPS

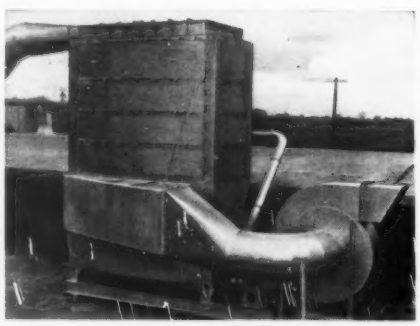
5 reasons for using DAY "AC" (HERSEY TYPE) DUST FILTERS for efficient dust control

DAY Dust Filters are doing an outstanding job in a wide variety of applications. Here are five reasons why so many manufacturers use (and reorder) DAY Dust Filters.

1. **Constant resistance resulting in constant air volumes.**
2. **High pressure reverse jet cleaning of filter tubes gives high air-to-cloth ratio.**
3. **Self-adjusting blow rings assure perfect tube cleaning, giving maximum air volumes at lowest pressures.**
4. **No shut-down to clean. Constant, automatic operation.**
5. **Installation requires minimum space.**

DAY service includes surveying your dust problem, engineering a practical solution, manufacturing required equipment including Exhausters, Cyclonic Separators, Filters, Piping, Fittings, and Hoods required to complete the system. ONE UNDIVIDED RESPONSIBILITY.
If you have a dust control problem, whether it involves a complete dust control system or a single unit, your inquiry is invited. WRITE FOR BULLETIN 528-R.

DAY "AC" Dust Filter installation, Lapp Insulator Company, LeRoy, New York. The company reports —"most of our dust is very fine and varies in size from 1 micron to 25 microns. The DAY Dust Filter solved our dust problem".



DAY SINCE 1881 DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM

The **DAY** *Company*
807 Third Ave. N. E. • Minneapolis 13, Minn.
IN CANADA: P.O. Box 70G, Ft. William, Ontario
Branch Plants: Buffalo, Ft. Worth and Toronto, Ontario
Representatives in Principal Cities

For more facts circle 549 on Reply Card

OPERATION—PRODUCTION

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Magnetic separator raises sheet for pick-up as punch press operator feeds press

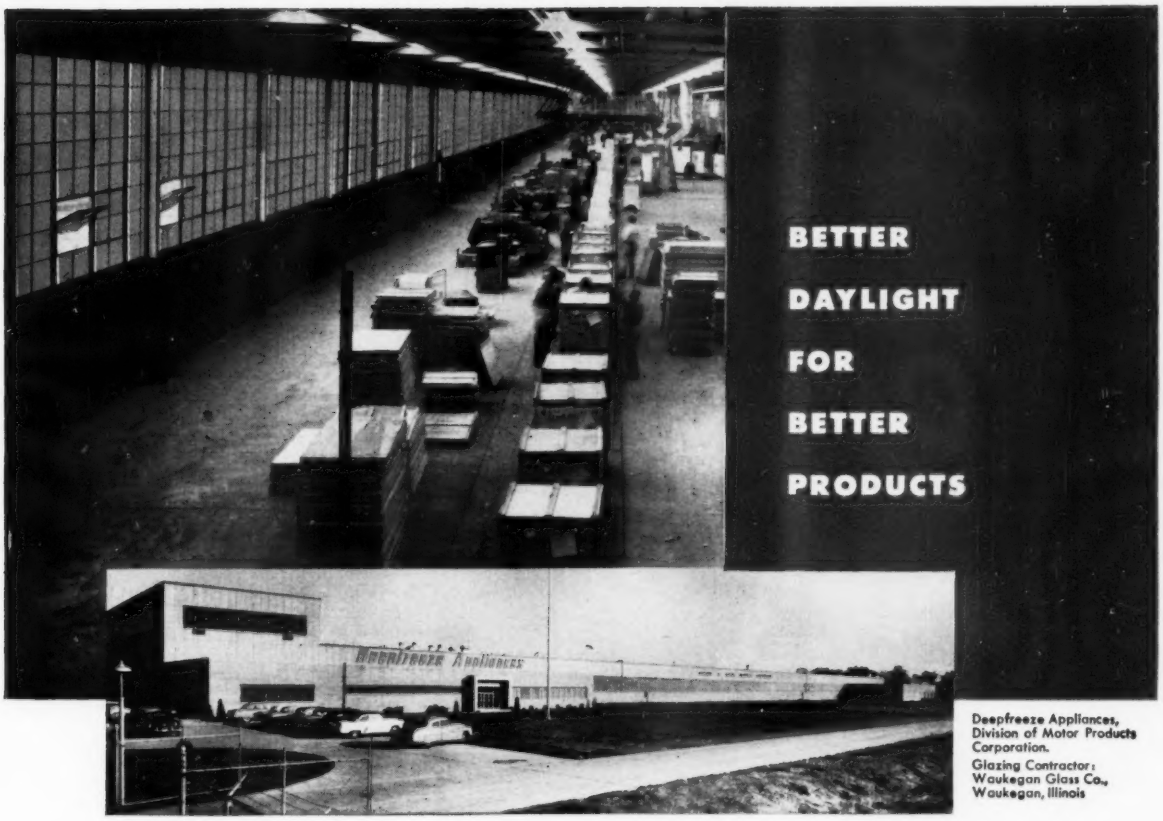
duced these injuries greatly, and in cases where polished or specially finished sheets were being fed into the press, the finish is no longer marred by the lifting tool.

Lamp Service From Cranes

As A SERVICE feature in a two-million-dollar electrical system installed at the new Grumman Aircraft Engineering Corp. plant on Long Island, each crane in the assembly areas has been equipped with a "hanging basket."

Designed by Broadway Maintenance Corp., installers of the electrical sys-

Electrician in hanging basket is in position to easily service light fixtures



Deepfreeze Appliances, Division of Motor Products Corporation.
Glazing Contractor: Waukegan Glass Co., Waukegan, Illinois

New Deepfreeze Plant Installs Coolite Glass To Eliminate Harmful Effects of "Raw Sunlight"

Deepfreeze, famous manufacturer of modern appliances for modern living, recognizes the importance of proper factory lighting to boost efficiency and employe morale. "Raw Sunlight" contains many factors that adversely affect your workers and their output. Excess solar heat makes interiors uncomfortable . . . and blinding glare makes seeing tasks difficult and tiring. This new Deepfreeze plant is glazed with 8000 square feet of Mississippi Coolite, Heat Absorbing, Glare Reducing Glass, which effectively controls the quality of light flooding work areas . . . banishes objectionable glare . . . cuts costly eye fatigue that results in seeing errors.

The Coolite in this modern plant is glare reduced on both sides, affording a maximum diffusion of light with a minimum of glare. Workers see better . . . feel better . . . work better in better light by Coolite.

If you are planning new construction or modernization, investigate Coolite. See how it can give you increased economy and efficiency. Call your nearby Mississippi Glass distributor today.

Send for free catalog, "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

MISSISSIPPI *Glass* COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

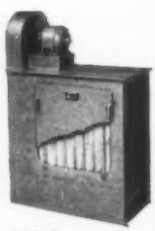
see our catalog in ARCHITECTURAL FILE or write for copy

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

For more facts circle 550 on Reply Card

Buy Guaranteed Efficiency in your Dust Collection... Consult Norblo

Guaranteed efficiency of fume and dust collection systems engineered and built by Norblo is obtainable because Norblo Equipment includes automatic bag type, improved centrifugal, and hydraulic types. Your operations may require one of these types — or all three! Norblo can tell you — will engineer the necessary combination to handle your dust and fume collection at most economical cost. More than 40 years experience serving many industries. State your problem so we can send literature on equipment applicable to your needs.



Norblo *Portable* Dust Collecting Units solve many localized problems.

Ask for Bulletin 163-5

The Northern Blower Company

Engineered Dust Collection Systems for All Industries

6423 Barberton Ave. OLympic 1-1300 Cleveland 3, Ohio

For more facts circle 551 on Reply Card

OPERATION— PRODUCTION

(O and P begins on page 60)

tem, the baskets accommodate an electrician, carrying him directly under the fluorescent fixtures in the area. Riding in the basket, which is large enough to carry spare lamps and spare parts for replacement, the electrician can easily reach the light fixtures for necessary servicing. The basket is propelled across the crane beam by means of a chain and sprocket drive, actuated by the electrician in the basket.

Visual Records Hasten Tractor Assembly

IN ORDER TO CONTROL incoming purchases of parts and to spotlight shortages of parts scheduled for the tractor assembly line, IBM, Kardex and other record systems are kept by Massey-Harris Co., Racine, Wisc.

Book records, kept by the stockroom office, show the quantities of tractor models scheduled for production, how many have been completed and the number still to be assembled to complete the schedule.

If the stockroom should not have enough of any one part to finish a schedule, the part number and the quantity needed are posted on a board for that purpose. This information remains posted until a sufficient supply is received to eliminate the shortage. The board also serves as a reminder to stockroom employees to give priority attention to items in short supply within the plant and as an aid in day to day delivery of parts to the assembly line.

Each morning the chief expediter calls a meeting of all foremen to discuss ways of eliminating shortages.

Visible records check shortages of parts

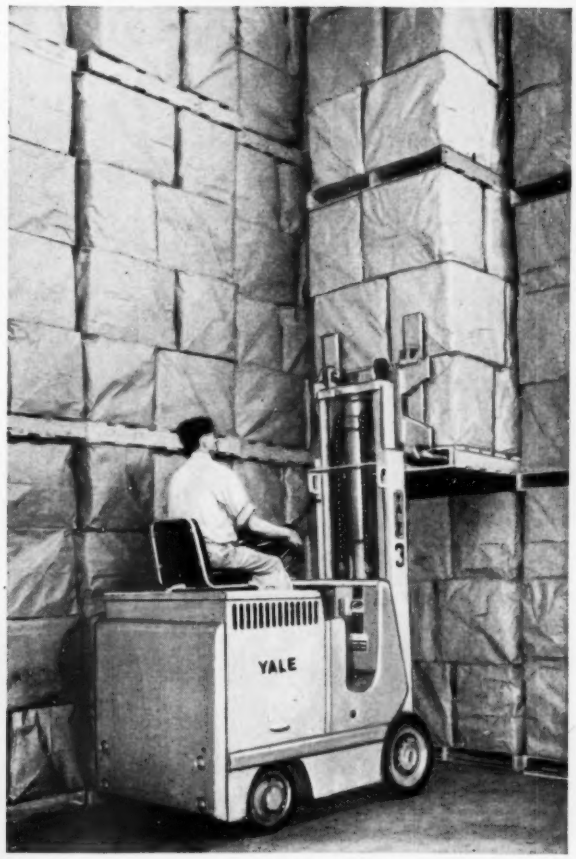
Now one Yale Electric Truck serves a variety of plant handling needs

Attachments enable YALE Trucks to perform dozens of specialized jobs... drastically reduce overall costs

Interchangeable YALE attachments . . . installed in minutes—removed as easily . . . put the mighty power plant and trouble-free hydraulic system of a YALE Electric Truck to work where you want it . . . doing jobs that formerly took many men hours or days . . . saving money in production, storage, and plant maintenance.

Versatile YALE Electric Trucks . . . and the industry's widest range of Gas, Diesel, and LP-Gas models . . . are now available under a flexible "3-Way-Finance-Plan" that is quickly adaptable to your needs. Ask your YALE representative for details or mail the coupon today.

Manipulating heavy, bulky loads is all in the day's work for this electric-powered YALE High-Lift Truck. It is equally efficient at many other handling jobs because it can be fitted with use-extending YALE attachments as needed.



YALE Quality Control Assures Years of Extra Truck Life

Every YALE Truck must constantly undergo critical inspections . . . meet exacting standards . . . be checked during every stage of production. That's why the YALE name identifies the finest Industrial Trucks that you can buy and use.

YALE*

INDUSTRIAL LIFT TRUCKS AND HOISTS

*Reg. U. S. Pat. Off.

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 477
Roosevelt Boulevard, Philadelphia 15, Penna.

Please send me further information on:

☐ YALE Trucks and attachments
☐ 3-Way-Finance-Plan

Company_____

Name_____ Title_____

Street_____ City_____ State_____

In Canada write: The Yale & Towne Manufacturing Company
St. Catharines, Ontario, Canada

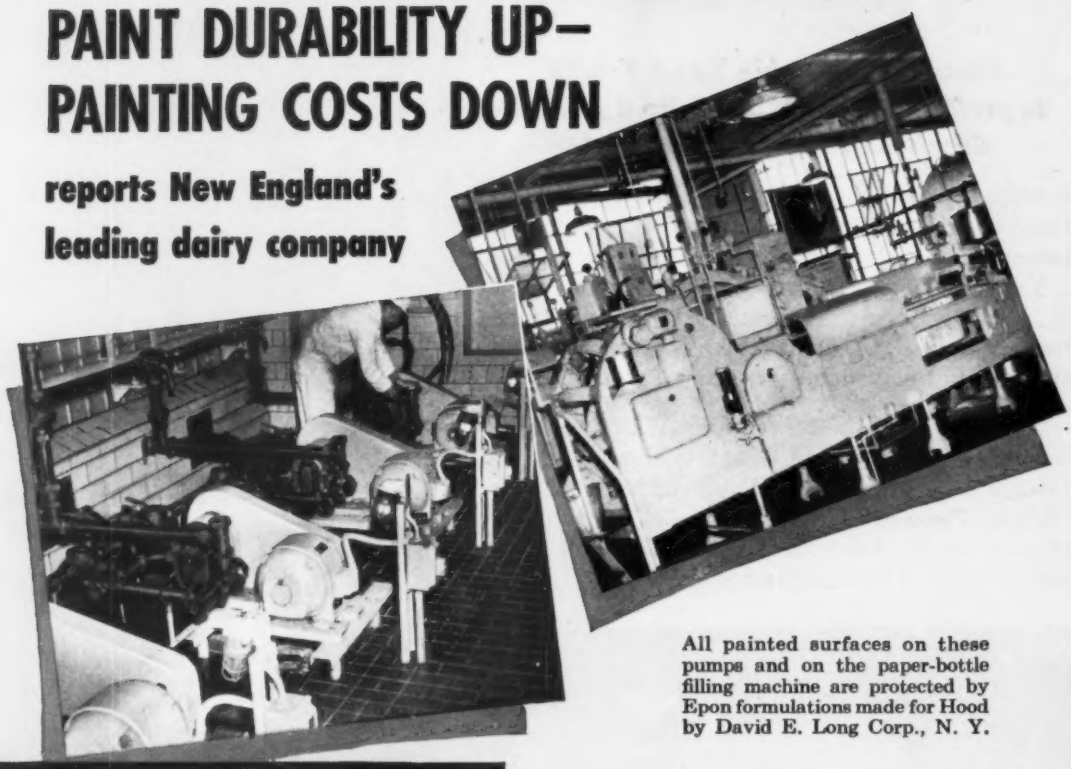
Gas, Electric, Diesel & LP-Gas Industrial Trucks • Worksavers • Hand Trucks • Hand & Electric Hoists • Pul-Lifts

For more facts circle 552 on Reply Card

EPON® RESIN does it!

PAINT DURABILITY UP— PAINTING COSTS DOWN

reports New England's leading dairy company



All painted surfaces on these pumps and on the paper-bottle filling machine are protected by Epon formulations made for Hood by David E. Long Corp., N. Y.

HERE'S HOW...

PAINTING is an important part of maintenance in a dairy plant—both for appearance and cleanliness. The paint must meet a wide range of conditions—steamy heat of processing rooms, near-freezing of circulation piping, scouring action of alkalies and detergents.

After conducting patch tests, H. P. Hood & Sons applied Epon resin-based paints experimentally to walls and ceilings of their laboratories, offices, bottling and processing rooms, and on piping and machinery.

The Hood results to date indicate Epon-based paints have these advantages: They can be applied directly to plaster, brick and cement with no special surface preparation. Two coats are adequate to cover any surface. Intervals between paintings are notably lengthened, which means substantial savings in labor and paint.

* * *

If you want real savings, ask your supplier for Epon resin-based paints and enamels. You'll find that these formulations have excellent adhesion; high resistance to impact and abrasion; outstanding resistance to moisture, heat and corrosives.

Call on our sales offices for names of suppliers who sell Epon resin coatings for your particular need. Write for the full Epon coatings story in the new brochure "Planning to Paint a Pyramid?"

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Chemical Partner of Industry and Agriculture
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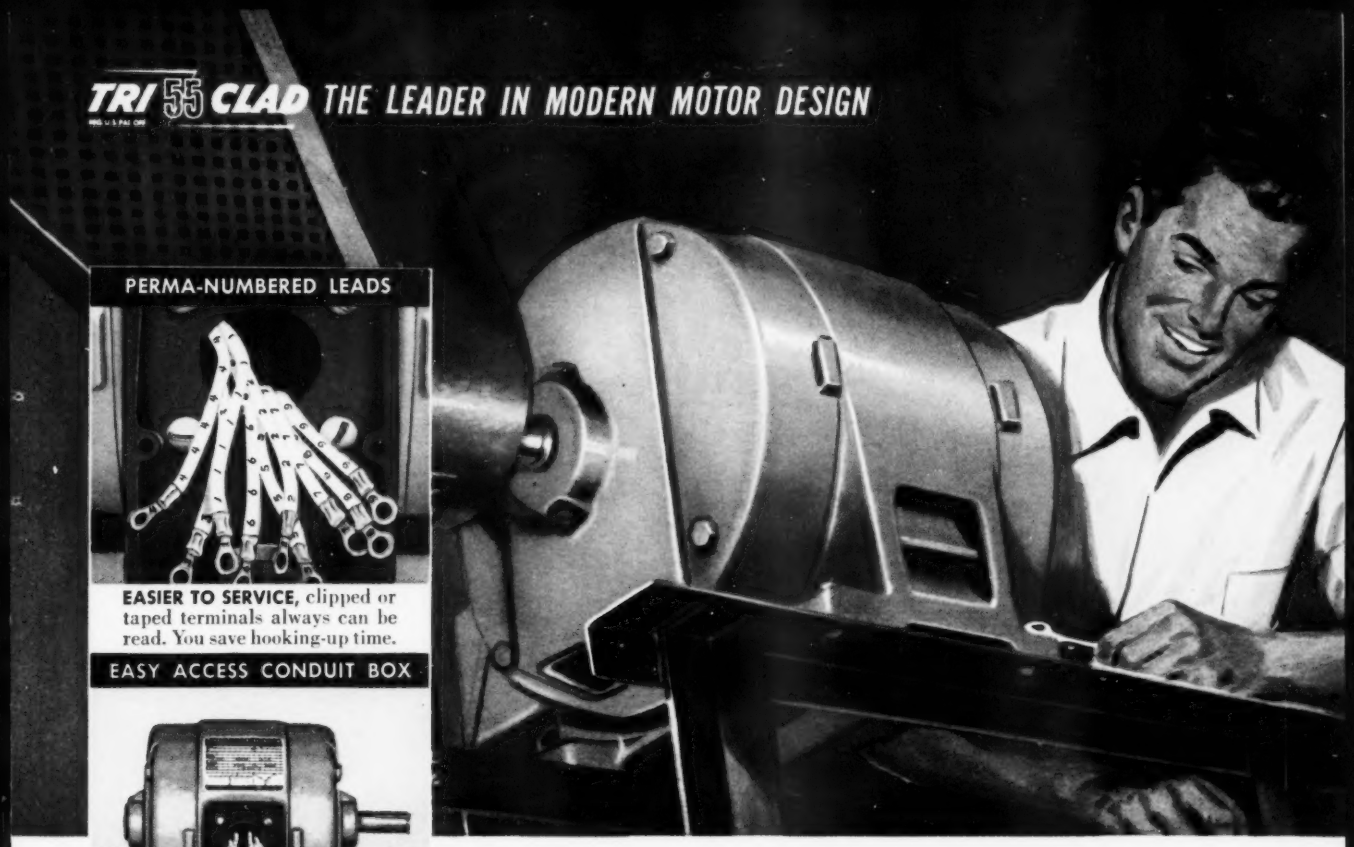
TRI 55 CLAD THE LEADER IN MODERN MOTOR DESIGN



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EASIER TO SERVICE, clipped or taped terminals always can be read. You save hooking-up time.

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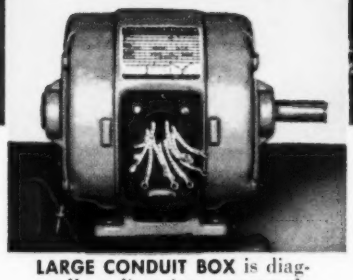

LARGE CONDUIT BOX is diagonally split—gives you ample knuckle room for easier wiring.

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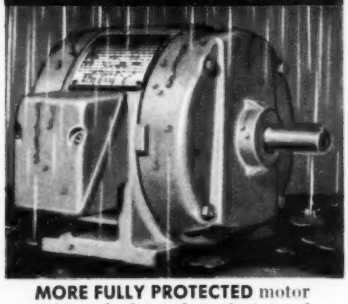
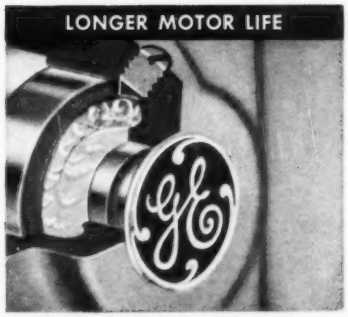


MORE FULLY PROTECTED motor achieved through redesign of cast iron frame and end shields.

LONGER MOTOR LIFE



NEW BEARING SYSTEM means the G-E motor runs longer without relubrication than any other.

Now, easier installation, less maintenance...

G.E.'s new TRI 55 CLAD motor—you can install it and forget it!

REG. U.S. PAT. OFF.

The all-new General Electric Tri/Clad '55' motor is specially engineered to reduce your installation costs . . . and run longer, without attention, than ordinary motors. This new motor gives you 60% more physical protection plus longer electrical life. In addition, a bearing system designed to use the most modern greases means you will not have to regrease the Tri/Clad '55' for years.

You save with the new Tri/Clad '55' because wiring is easier and faster. The large, diagonally split conduit box gives you plenty of knuckle room. Leads are perma-numbered . . . you can always identify them instantly.

The new Tri/Clad '55' also brings you important handling, storing and installing economies. Better use of space within the frame means a 30% reduction in size and weight in some ratings. Yet active materials (magnetic steel and copper) are not sacrificed.

General Electric Tri/Clad '55' motors are now available in many ratings. The complete line of 1 to 30 hp a-c motors will be available soon. For full details contact your G-E Apparatus Sales Office or G-E Motor Supplier today. Write for Tri/Clad '55' bulletins GEA-6013—Dripproof motors, GEA-6012—Enclosed motors, GEA-6027—Gear-motors. General Electric Company, Section 648-7, Schenectady 5, N. Y.

Progress is our most important product

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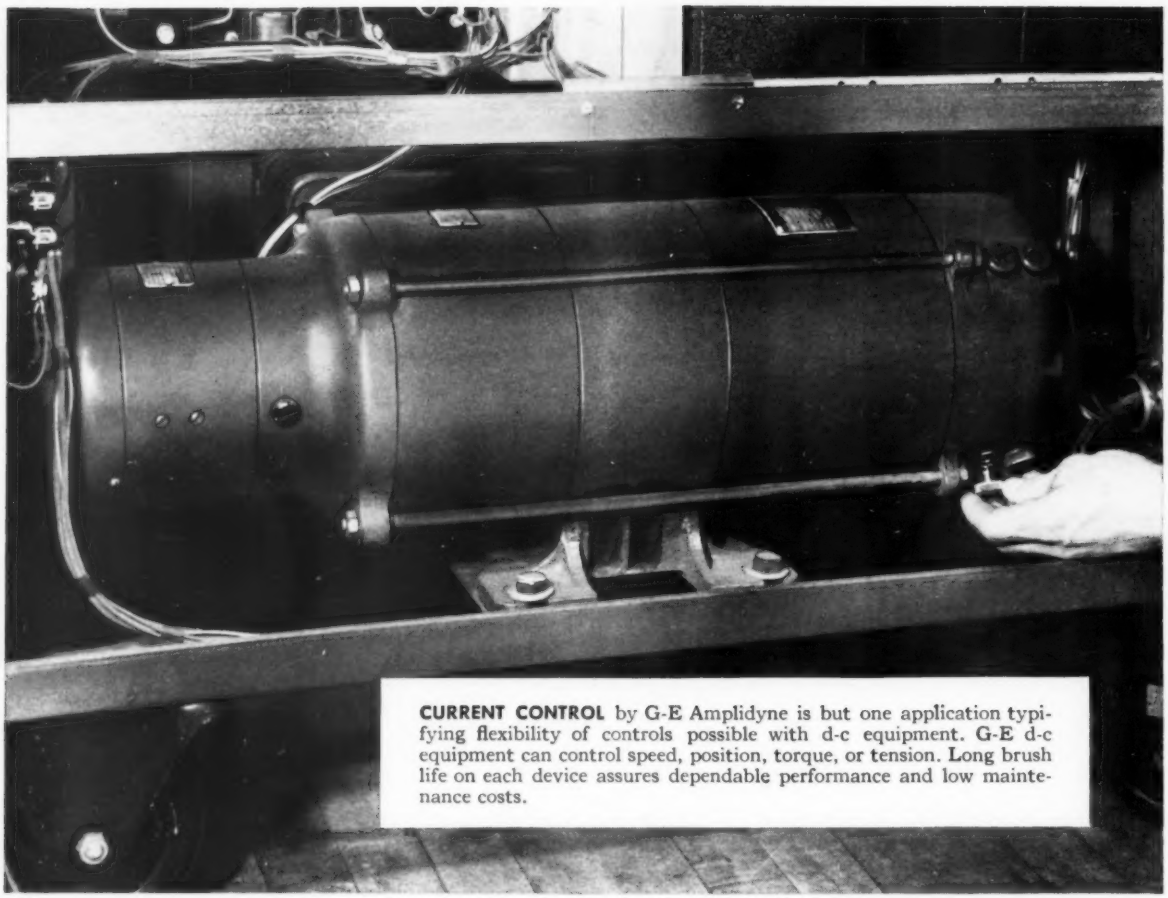

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APPLICATION ENGINEERS at G.E. are anxious to help you get efficient control systems. For more information on this service and on d-c equipment, see your local G-E Apparatus Sales Office or Authorized G-E Distributor. General Electric Company, Schenectady 5, N. Y. 704-12

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You can put your confidence in—

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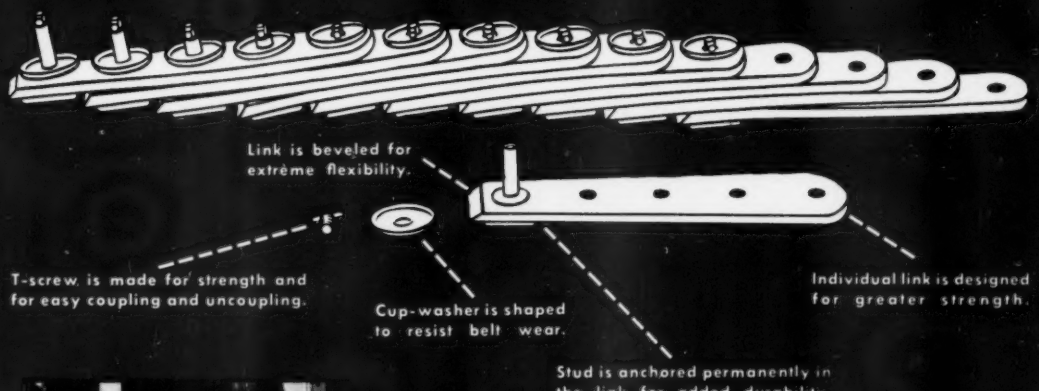
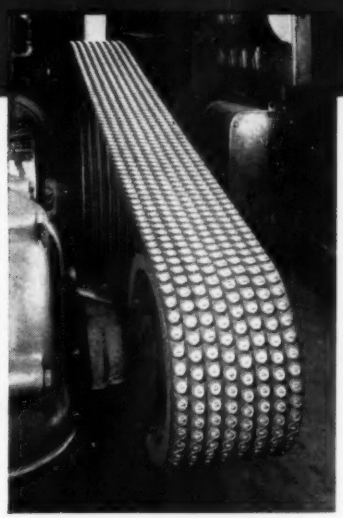
This detailed line drawing of the new, patented Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job . . . easier!


Link is beveled for extreme flexibility.
T-screw is made for strength and for easy coupling and uncoupling.
Cup-washer is shaped to resist belt wear.
Stud is anchored permanently in the link for added durability.
Individual link is designed for greater strength.



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TD and TE Adjustable V-belt

So easy to couple *it installs in minutes*

So strong and durable *it lasts for years*

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It simplifies installation. Links are quickly joined by easy-to-use cup-washers and T-screws to make up individual belts. It's the easiest v-belt to couple and uncouple ever developed. And you don't need to waste time removing outboard bearings.

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THE LINK
V-BELT

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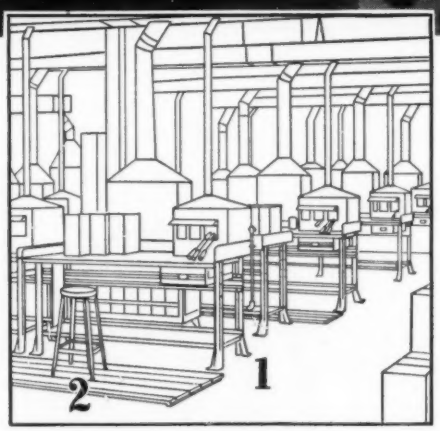
Sturdy steel legs, long-wearing steel tops, and a variety of standard interchangeable accessories—shelves, drawer units, utility cabinets—make HALLOWELL work benches a sound investment in cost-reducing shop equipment. And these production-increasing units may be used individually or in continuous line anywhere in your plant. For complete data, consult your HALLOWELL distributor or write STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.



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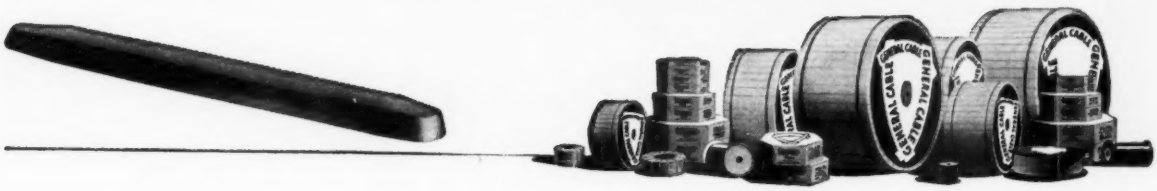

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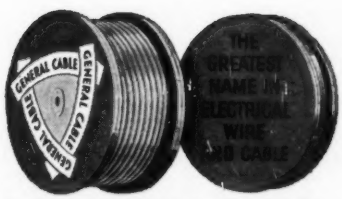

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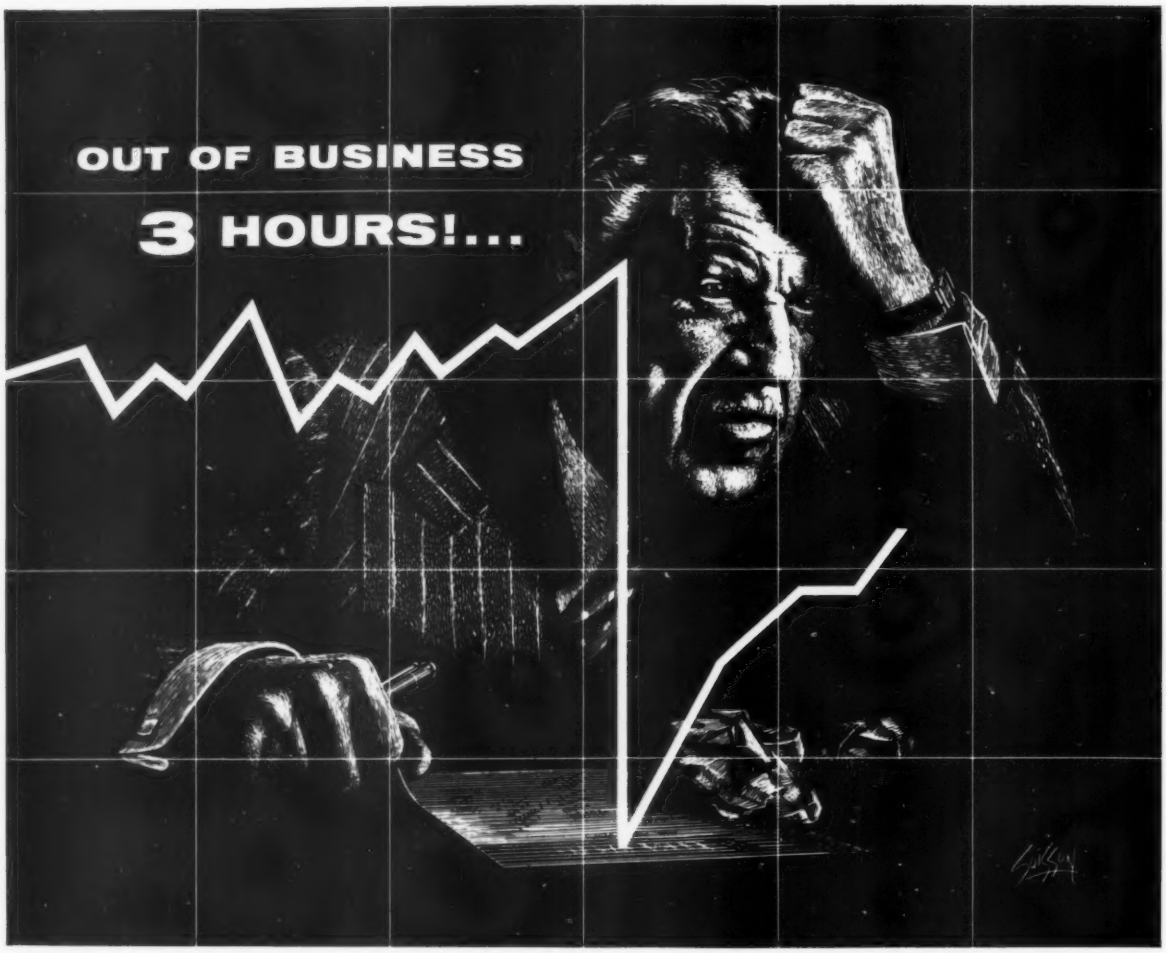

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EC&M Valimitor Starters provide unlimited short circuit protection for 2200-5000 volt motors.

EC&M Motor Starters could have prevented this work stoppage . . . the costly downtime, the delay, the repairs. Unlimited protection against fault currents, regardless of their magnitude, is assured by the Valimitor Starters (volt-ampere-limitor) for 2200-5000 volt motors.

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Whatever your requirements, EC&M Motor Starters will provide the protection you need against losses caused by fault currents.

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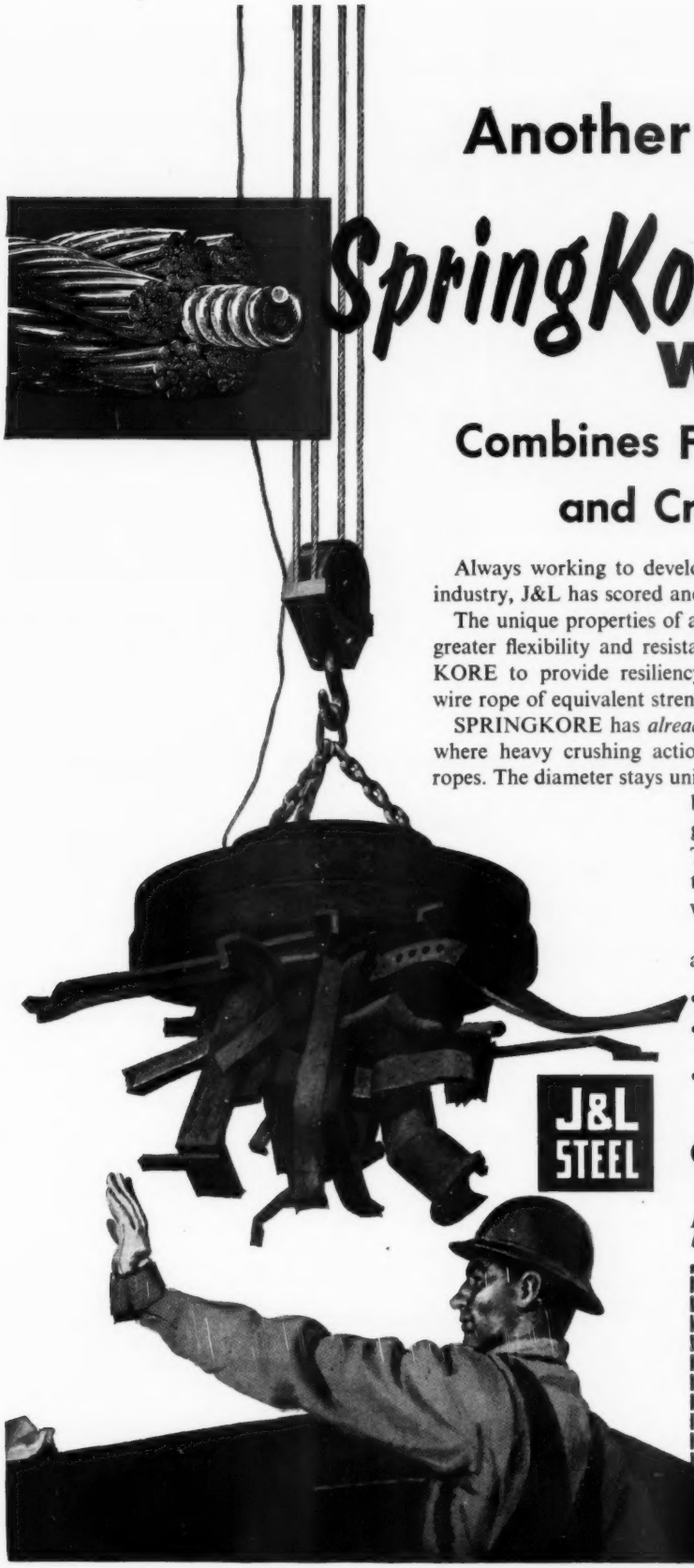

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Combines Flexibility and Crush Resistance

Always working to develop better, more economical wire ropes for industry, J&L has scored another first—SPRINGKORE.

The unique properties of a tightly coiled high quality steel spring . . . greater flexibility and resistance to crushing—are built into SPRINGKORE to provide resiliency and toughness never before possible in wire rope of equivalent strength and cost.

SPRINGKORE has *already* proved itself in the field on applications where heavy crushing action limits the service life of ordinary wire ropes. The diameter stays uniform for a longer period of time. Clearance between strands is maintained resulting in greater flexibility and increased fatigue life. The coiled spring forms a reservoir permitting excellent lubrication to reduce internal wear and corrosion.

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For further information, write for J&L's new booklet, "New Wire Rope for Industrial Uses."

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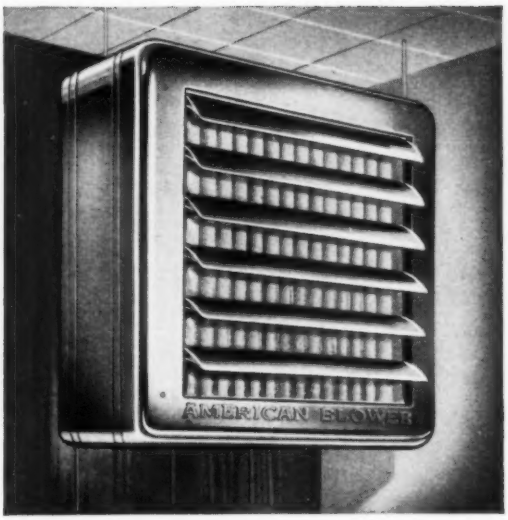
Venturafin Vertical Unit Heater. Capacities: 58,400 to 560,000 BTU at 2 pounds steam pressure and 60° F. entering air.



Venturafin Horizontal Unit Heater. 18,000 to 357,500 BTU at 2 pounds steam pressure, 60° F. entering air.

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At last—a horizontal heater that's truly quiet . . . a vertical heater with heat-flow control! Both in a wide range of sizes!

They're here, now! New Venturafin Unit Heaters — quiet operating, efficient, easy to install . . . yet priced with the lowest!

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Casings on Venturafin Unit Heaters are ruggedly constructed of heavy-gauge furniture steel, die formed for perfect fit and freedom from rattles; finished in gleaming, easy-to-clean baked enamel.

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CONSTRUCTION BRIEFS —a review of fundamentals for the plant engineer

Prepared by Byron A. Engelbach, Plant Engineer

DEFLECTION

The sag developed in a beam due to superimposed loading or due to the weight of the beam itself is referred to as *Deflection.*

The stiffer the beam, the less sag or deflection. There are cases in building design where the amount of deflection makes no difference, providing the beam is stiff enough and strong enough to carry the load without failure. However, in most cases the amount of permissible deflection is limited. In the case of a plastered ceiling, if the ceiling rafters sag or deflect too much, the plaster will crack. The customary practice among designers is to limit the deflection to 1/30 in. per foot of length of member, or 1/360 of the entire span expressed in inches.

Even though a beam is strong enough to carry the load, when the deflection exceeds the limit, a stiffer beam must be selected for use.

There is no need to investigate the derivation of the deflection formulae in this Brief. The basic formula is

$$\text{Deflection} = \frac{KWl^3}{EI}$$

where W = Total load in pounds.
l = span length of beam (in.).
E = Modulus of Elasticity (psi).
I = Moment of Inertia.
K = a constant which changes with manner of loading and method of support.

Constant K has been established for most of the standard methods of loading and means of supporting the beam. It is available in most Engineering Handbooks.

Problem No. 1.

Check the strength and stiffness of a long leaf yellow pine beam, 2 in. x 10 in., simply supported, spanning 16 ft and carrying a uniformly distributed load of 1300 lb.

Data:

Refer to Fig. No. 1. The allowable safe load is 1000 psi. Modulus of Elasticity is 1,200,000 lb. Use full dimensions, not dressed dimensions in calculations.

Solution:

Substitute in the formula

$$\frac{Wl}{8} = \frac{bh^2}{6} \times f$$

to solve for fiber stress.

$$\frac{1300 \times 192}{8} = \frac{2 \times (10)^2}{6} \times f$$

$$f = 936 \text{ psi.}$$

From the fact that calculated fiber stress in the beam is only 936 psi as compared with the allowable fiber stress of 1000 psi, it is established that the beam is sufficiently strong to carry the load.

Substitute in Deflection Formula

The actual deflection of the beam is found by substitution in the formula for deflection found in the AISC Steel Handbook for this type loading and end support:

$$\text{Deflection} = \frac{5Wl^3}{384\ EI}$$

$$\text{Then } I = \frac{bh^3}{12} = \frac{2 \times (10)^3}{12} = 166.6$$

$$\text{Deflection} = \frac{5 \times 1300 \times (192)^3}{384 \times 1{,}200{,}000 \times 166.6}$$

$$= 0.6 \text{ in.}$$

By rule the deflection allowed is 1/360 x 192, or 0.533 in.

Therefore, even though the beam is strong enough it is not stiff enough, and a larger beam will be necessary.

Problem No. 2.

Choose an I-beam sufficiently strong and stiff to carry a section of floor 10 ft wide spanning 16 ft. The uniform load is assumed at 160 lb per sq ft of floor.

Data:

Refer to Fig. No. 2. The allowable fiber stress of steel is 16,000 psi. The Modulus of Elasticity for steel is 29,000,000 lb. It is to be assumed that the 160-lb uniform load includes the dead load of the supporting beam and flooring.

Solution:

The area of the floor to be supported is 10 x 16 = 160 sq ft.

The total uniformly distributed load on the beams is 160 sq ft x 160 psi = 25,600 lb.

Solve for the Section Modulus in the formula

$$\frac{Wl}{8} = f \times \text{Section Modulus}$$

By substitution

$$\frac{25{,}600 \times 192}{8} = 16{,}000 \times \text{S.M.}$$

Then Section Modulus = 38.4

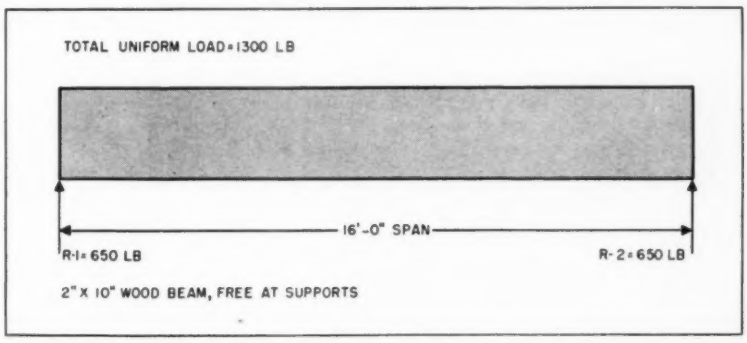


Fig. 1. Uniformly loaded beam. Determine ability of beam to carry the load

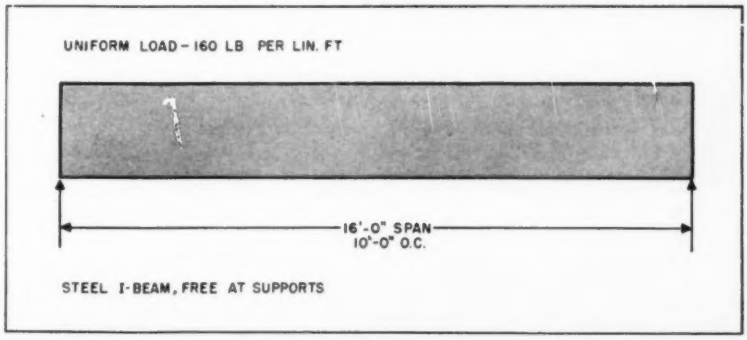


Fig. 2. Steel I-beam supporting floor section. Find beam size required for load

From the AISC Steel Handbook or the Pocket Companion find in the Table titled "Economical Section Moduli for Sections of Beams" opposite a Section Modulus of 39.9 (which is slightly greater than the calculated Section Modulus) a 14 inch, Wide Flange 30-lb beam as the first selection.

Stiffness must next be checked and substitution in the formula,

$$\text{Deflection} = \frac{5\ W\ l^3}{384\ E\ I}$$

should be made.

In the steel handbook in the tables giving properties of beam sections, the Moment of Inertia for the 14-in. Wide Flange 30-lb beam will be found to be 289.6.

Then Deflection =

$$\frac{5 \times 25{,}600 \times (192)^3}{384 \times 29{,}000{,}000 \times 289.6}$$

Deflection = 0.28 in.

The allowable deflection by rule is 1/360 x 192 in., which equals 0.53 in. Since the actual deflection is considerably less than the allowable, the beam is stiff enough for the load.

Problem No. 3.

Find the deflection of a wooden beam, simply supported, 15 ft long and 6 in. x 14 in. in cross section. A superimposed concentrated load of 4800 lb is located at the center of the span.

Data:

Refer to Fig. No. 3. The allowable fiber stress is 1000 psi. Disregard the uniform load of the beam itself. The modulus of elasticity is 1,200,000 lb. The full dimensions of the beam are to be used, not the dressed dimensions.

Solution:

The deflection formula to be used in this case will be found in the AISC Handbook and is:

$$\text{Deflection} = \frac{W\ l^3}{48\ E\ I}$$

Since $I = \frac{6 \times (14)^3}{12} = 1372$,

and $l = 15 \times 12 = 180$,

By substitution

$$\text{Deflection} = \frac{4800 \times (180)^3}{48 \times 1{,}200{,}000 \times 1372}$$

Deflection = 0.35 in.

With a permissible deflection of 1/360 x 180 in. or 0.50 in., this beam is stiff enough to carry the load.

Problem No. 4.

Assume a floor whose total uniform load is 60 lb per sq ft carried by long leaf yellow pine floor joists 6 in. x 14 in. (dressed dimensions) 3 ft. on centers, spanning 16 ft. There is also a concentrated load imposed by a piece of processing equipment weighing 1000 lb. Check the beam for stiffness and strength, keeping in mind that the concentrated load may be at any position on the floor joist.

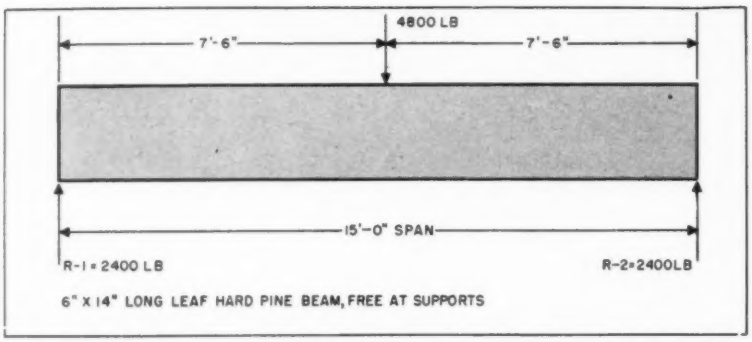


Fig. 3. Wooden beam supporting concentrated load. Deflection to be calculated

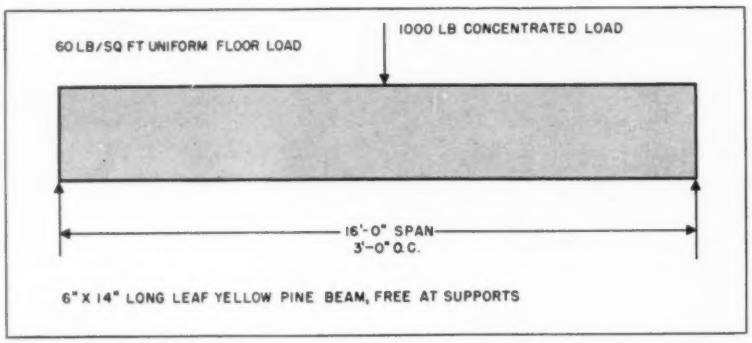


Fig. 4. Wooden beam supporting loaded floor section. Find beam strength

Data:

Refer to Fig. No. 4. Allowable fiber stress is 1000 psi. Modulus of elasicity is 1,200,000 lb. Beam is freely supported.

Solution:

The designer knows that maximum loading conditions occur in this case when the concentrated load is at the center of the span. It is obvious that if the beam will be stiff enough to carry the load in this position, it will carry it at any other location.

The floor area carried by the beam is 3 x 16 = 48 sq ft

Therefore the total uniform load is 48 x 60 = 2880 lb.

$$I = \frac{6 \times (14)^3}{12} = 1372$$

By substitution in deflection formula for uniform load:

$$\text{Deflection} = \frac{5Wl^3}{384EI}$$

$$\frac{5 \times 2880 \times (192)^3}{384 \times 1{,}200{,}000 \times 1372}$$

Deflection = 0.16 in.

By substitution in deflection formula for concentrated load:

$$\text{Deflection} = \frac{Wl^3}{48EI}$$

$$= \frac{1000 \times (192)^3}{48 \times 1{,}200{,}000 \times 1372}$$

Deflection = 0.09 in.

Total Deflection = 0.16 + 0.09 = 0.25 in.

Allowable Defl. = 1/360 × 16 × 12 = 0.53 in.

The deflection is less than 50 per cent of the permissible amount, indicating that the beam is safe for stiffness.

The bending moment for the uniform load is:

$$\text{B.M.} = \frac{W\ l}{8} = \frac{2880 \times 192}{8}$$

= 69,120 in. lb.

The bending moment for the conc. load is:

$$\text{B.M.} = \frac{W\ l}{4} = \frac{1000 \times 192}{4}$$

= 48,000 in. lb.

Total B.M. =
69,120 + 48,000 = 117,120 in. lb

Use the Bend. Mom. Formula

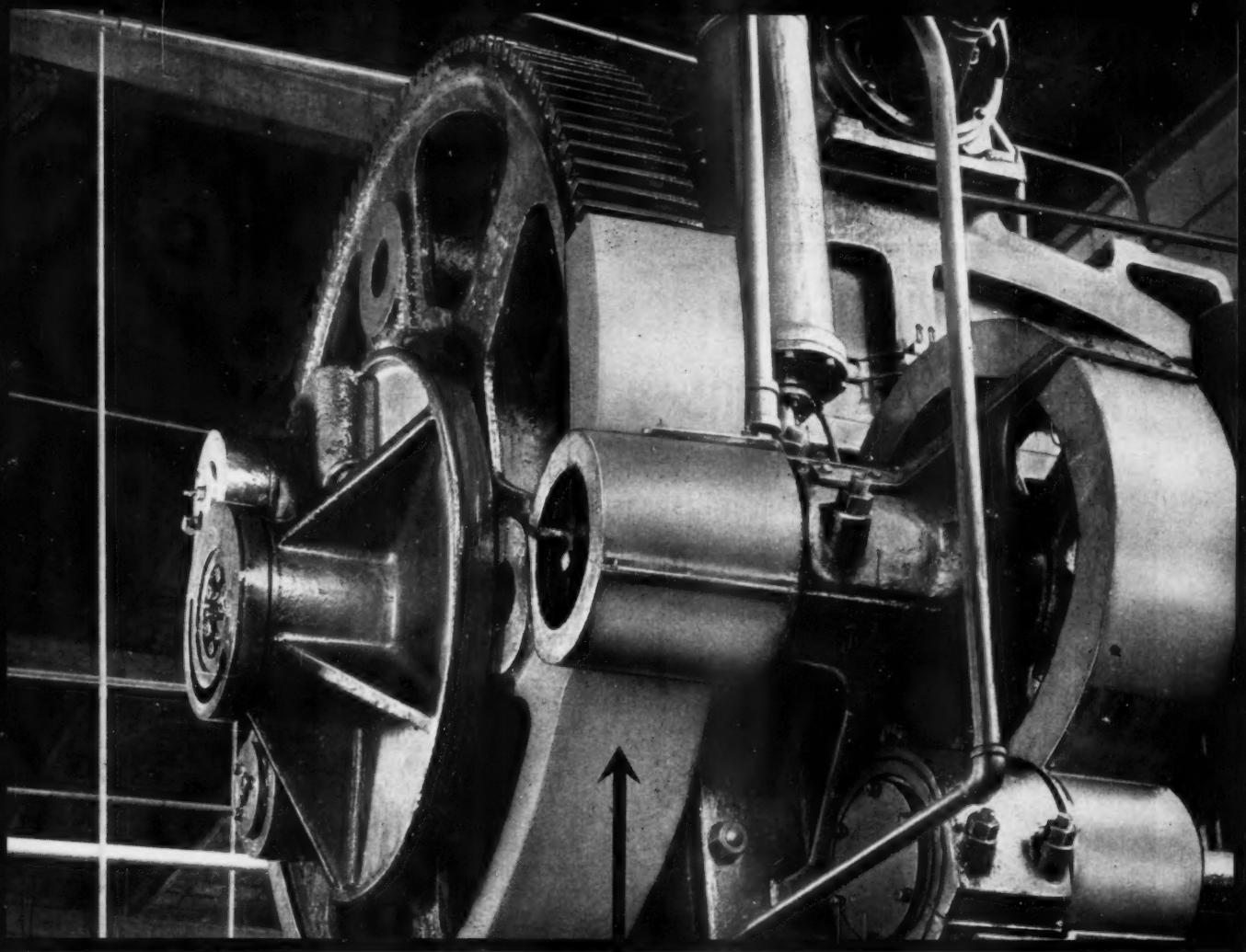
$$\text{B.M.} = f \times \frac{bh^2}{6}$$

By Substitution

$$117{,}120 = f \times \frac{6 \times (14)^2}{6}$$

Fiber Stress = 598 psi.

Comparison of this calculated fiber stress with the permissible fiber stress shows that the beam is sufficiently strong to carry the load.



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Calumet Viscous Lubricants

• The lubrication of exposed gears on a 250 ton press caused trouble for a midwest metal-working company. Lubricant throw-off was excessive, creating unfavorable working conditions; frequent applications of grease interfered with production and raised lubricant consumption. The gear shield in use required pre-heating.

A Standard Oil Lubrication Engineer surveyed the situation three years ago and suggested the use of Calumet Viscous Lubricant 10X, because it is a grease of superior adhesive quality and does not require pre-heating.

Since that time the plant has used Calumet Viscous Lubricant 10X with outstanding results. Run-off to the floors and other parts has been eliminated. Gears are lubricated with maximum efficiency. Most important, lubricant consumption has been cut by more than 20%.

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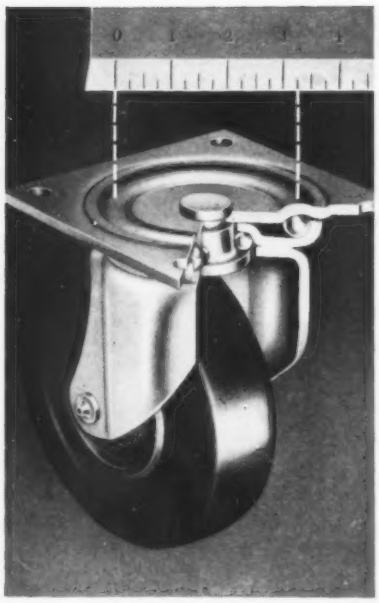
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

Bigger swivel bearing area keeps heavy loads steady



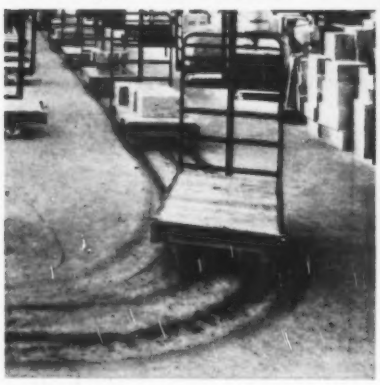
Reduces raceway wear, gives longer life, easier swiveling

Important in caster design is the diameter of the main swivel bearing and balls.

The larger this area, the greater the safety factor with proportionately less wear and tear on the caster. Avoid premature caster failure by specifying Bassick's — all have extra-quality design features. The Bassick series "99" quality, double ball bearing casters have a main swivel bearing diameter at least 1⅛ inch greater than the wheel tread width — for easier swiveling and *more-for-the-money* service.

Compare these dimensions with the casters you now use. Your best bet in the long run is Bassick's — they roll and swivel easier and last longer under hard service.

Dripping grease harms floors, boosts your maintenance costs



Sights like this can be a thing of the past in your plant, now that Bassick has perfected its new "3D" caster — no Drip, no Dirt, no Drag. Floor surfaces and rubber wheel treads are safe from damage by leaking lubricant because exclusive Bassick design features seal in grease, seal out dirt or other foreign matter. Write for new catalog sheet 3D99-53.

File test shows extra hardness of Bassick swivel bearing parts

If file bites into raceway surfaces of casters you now use, better think about buying Bassick. Double ball bearing swivel parts of all Bassick cold-formed steel casters are full case-hardened to 15N90 Rockwell. They'll pass your test with flying colors, pay off for you in extra years of wear.

1954, meet 500 B.C.!

U. S. Army Photograph

This striking photo does more than compress history into a single vivid shot of old and new crossing paths in the Orient.

For the lumbering ox-cart with its tremendous wooden wheels isn't much more out of date than some materials-handling systems we've seen in use today. Old-style, inadequate casters are about as far behind Bassick's new 16" "Floating-Hub" caster (below) for 20-mph service, for example, as the ox-cart is behind the airplane.

The safest way to protect cargoes susceptible to shock damage during transport is through use of Bassick's "Floating-Hub" shock absorbing casters and wheels. Write for new "Floating-Hub" catalog FH-53.

New 20-mph caster.

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Your Bassick industrial distributor is the man to see for facts and figures on the most up-to-date line of shock-absorbing and conventional casters. Or you can write to Bassick direct.

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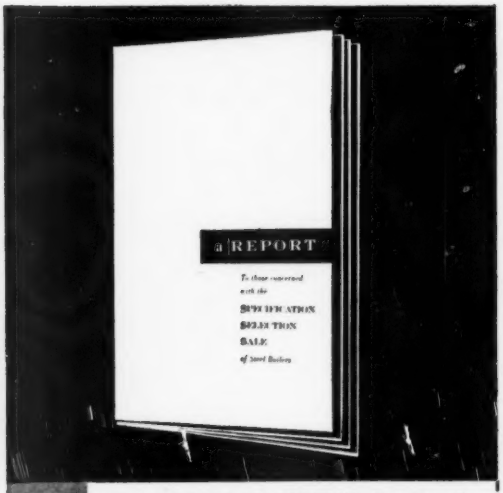

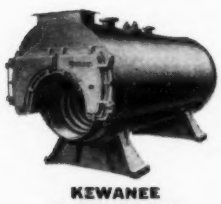

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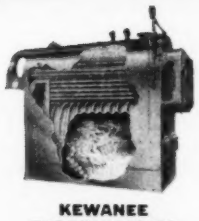

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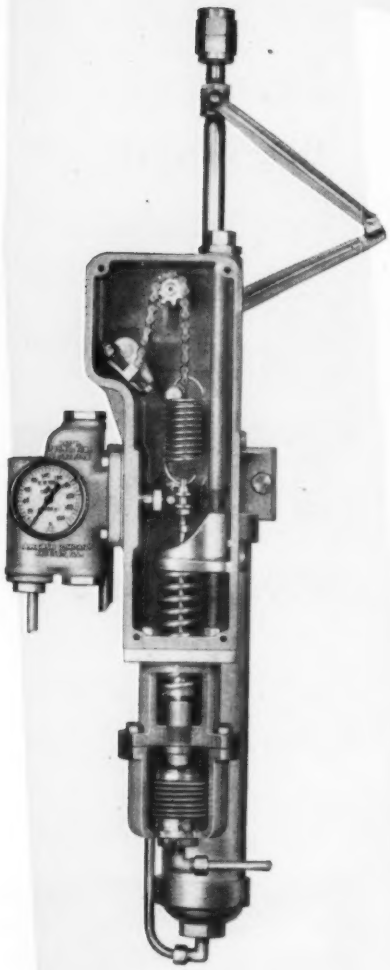

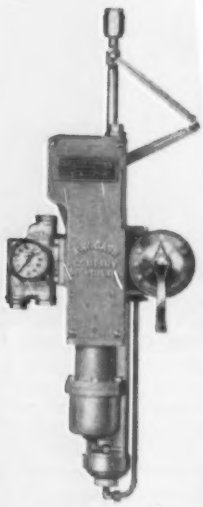

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Convair Research Looks to The Sun

Research department is using this solar furnace to test the reaction of various metals and ceramic materials exposed to intense heat of the sun

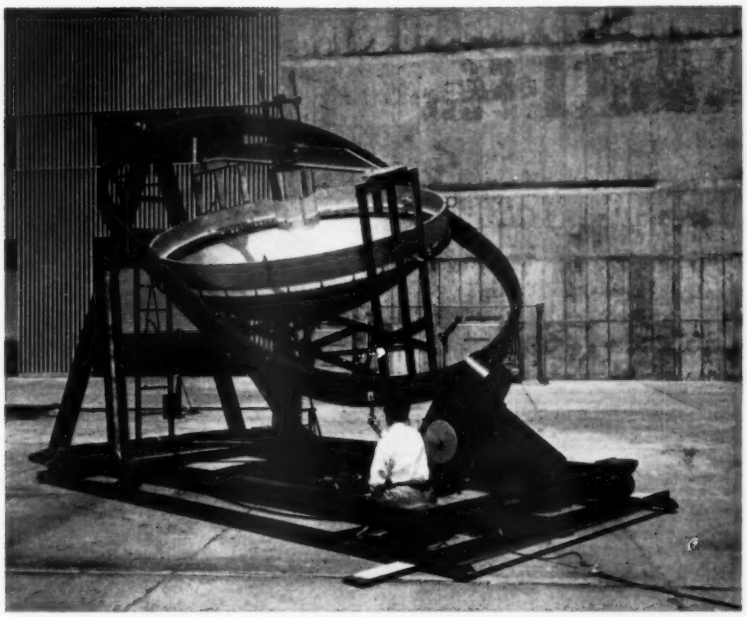


Fig. 1. Rays from the sun are collected by the large aluminum mirror and reflected to a dime-size focal point. The furnace can develop a temperature of 8500 F

LARGEST SOLAR FURNACE in this country is now being used by Consolidated Vultee Aircraft Corporation's San Diego division to study various metals and ceramic materials in connection with several research projects. Originally designed by Dr. W. M. Conn, the furnace was used at Rockhurst College before Convair acquired it recently.

The basic part of the instrument is a 120-in. dia polished aluminum mirror formed into a parabolic reflector. Made of ¼-in. aluminum, the reflector draws its power from a 10,000 F heat source—the sun's surface. Rays from the sun are collected by the huge mirror and reflected to a focal point, forming a $\frac{5}{16}$-in. dia image of the sun at a distance of 34 in. from the center of the mirror. Materials being tested are held by metal jaws at this dime-size focal point.

The intense heat at the focal point melts a steel bolt in a matter of seconds. When sky conditions are ideal, the furnace can develop a temperature of 8500 F, approximately 85 per cent of the temperature of the sun's surface. The temperature produced by an oxy-acetylene torch, by comparison, is around 5800 F.

Convair has found several advantages in using the solar furnace for research projects: (1) Heating is accomplished under very pure conditions and in an oxidizing atmosphere; (2) There is no interference from electric or magnetic fields or gases which often occurs when other types of furnaces are used; (3) Heat treating or melting and freezing of samples can be observed up to the highest temperatures, and very rapid heating and cooling are possible.

Principle of the solar furnace's operation is aptly illustrated by use of a small flashlight reflector to light a cigarette, Fig. 2. Sufficient heat is focused by the flashlight reflector, pointed toward the sun, to light the cigarette.

A bridge structure spanning the mirror a short distance beyond the focal spot supports the specimen holder. After part of the sample melts, adjacent regions are moved into the focal spot by means of a motor-driven screw. The bridge also supports a cylindrical barrel about 18 in. in diameter. This is used to shade a part of the mirror from the specimen so that the amount of solar radiation concentrated on the specimen can be controlled.

The mirror has a central opening 22 in. in diameter which permits easy observation of the focal spot area from a position on the ground behind the mirror. A telescope mounted at this opening permits viewing details of heating or melting magnified about 20 times.

In order to keep the focal spot in one location on the specimen, the mirror is mounted in a gimbal ring so that the polar axis of the mounting is parallel to that of the earth's. An accurate clock mechanism, driven by a sychronous motor, coordinates movement of the mirror with that of the sun, thus permitting extended experiments with the furnace.

Fig. 2. Principle of the 120-in. solar furnace is illustrated by using a small flashlight reflector to light a cigarette

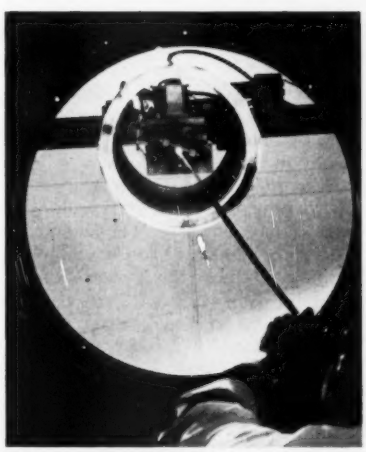


Fig. 3. Steel rod becomes white hot in seconds as end is held at focal point. Adjustable ring permits control of heat

Fig. 1. General view of two rectifiers

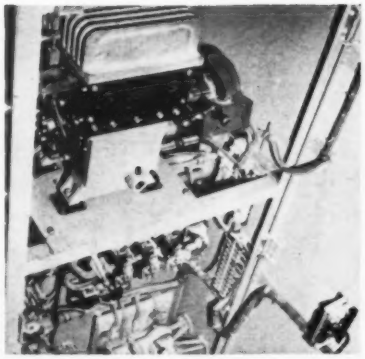


Fig. 2. Inner workings of the rectifier

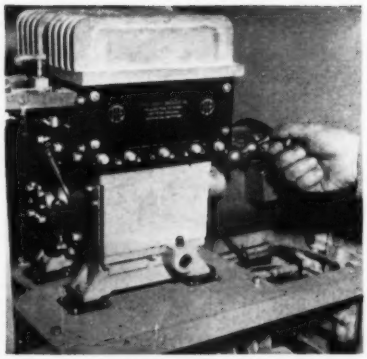


Fig. 3. View of contacting mechanism

Fig. 4. Closeup view shows contacts

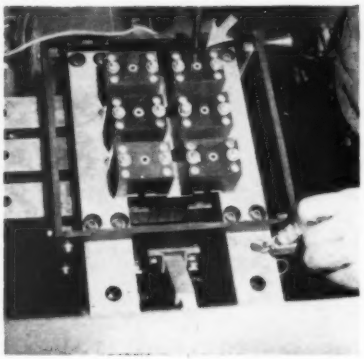


Fig. 5. Top view of the six contacts

Fig. 6. Shows how contacts are checked

MECHANICAL RECTIFIERS— How They're Maintained

Author tells in series of pictures the step by step preventive maintenance measures which should be followed when checking the operation of a mechanical rectifier

By **WALTER J. PRISE**, Chief Engineer, The Maintenance Co., Inc.

PREVENTIVE MAINTENANCE measures necessary to keep a mechanical rectifier in good operating condition consists of several steps. The first and most important one is to keep all rotating parts of the mechanical rectifier in good shape. The high speed synchronous motor requires certain attention. It must be properly lubricated and kept clean with proper ventilation. The most important part in operation is the contact making mechanism and contacts themselves.

Mechanical rectifier gets its name from the fact that electrical rectification in this equipment is provided by mechanical breaking of contacts at the zero point in a-c supply. In operation of a mechanical rectifier, the contacts between a-c input bus and d-c output bus break in such a manner that positive d-c bus will be connected only with positive alternations of the a-c cycle, and the negative d-c bus connected only with negative alternations of the a-c cycle.

To accomplish this the contacts must be operated in perfect synchronism and phase relationship with the frequency of the a-c supply. When three phase a-c input is used, full wave rectification is accomplished by the arrangement shown on the diagram, Fig. 13. Each phase of the input is connected to two sets of contacts, one set for making contacts to the positive d-c bus on positive side of a-c cycle and the other for making contacts to the negative d-c bus on negative part of a-c alternations.

To assure proper directional output of the rectifier, operation of the six sets of contacts associated with the three phases of the input, must be synchronized with the a-c supply by means of mechanism driven by the synchronous motor. The timing of breaking of contacts is very important. The slightest deviation from zero value of current will affect conditions of contact, will burn the metal on contact-making surfaces and will gradually destroy contacts and make operation of the mechanical rectifier impossible.

The contact making mechanism consists of eccentrics, levers and lift rods actuated by the rotating motion of the

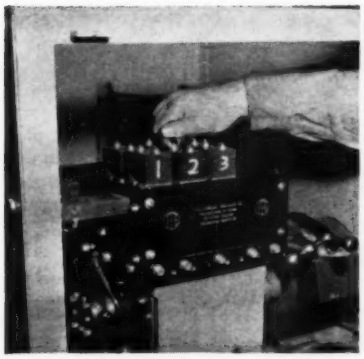


Fig. 7. Removing the contacts chamber

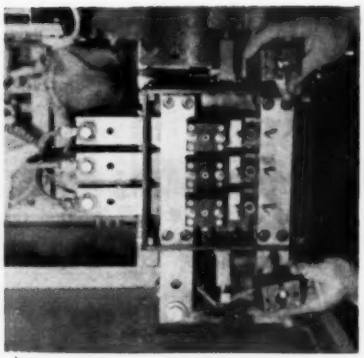


Fig. 8. Shows three exposed contacts

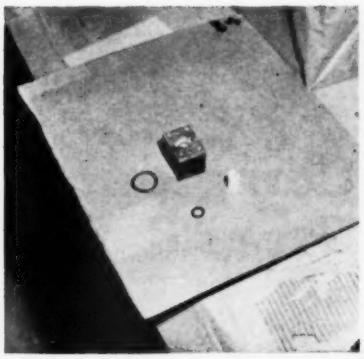


Fig. 9. Checking gaskets is important

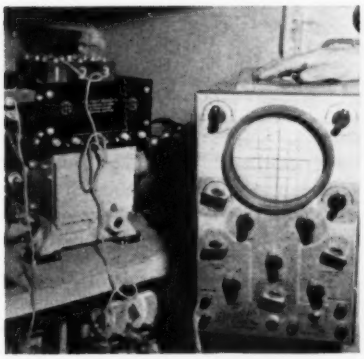


Fig. 10. Oscilloscope checks the timing

Fig. 11. Contacts inside the rectifier

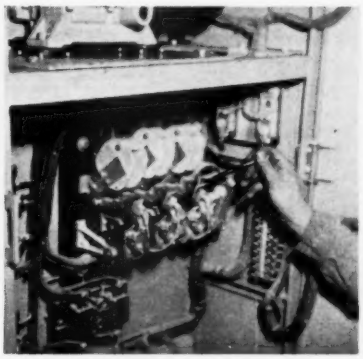


Fig 12. Examining contacts on a-c supply

synchronous motor. The 3600 rpm, three phase motor is used for driving the contacts. This motor must be in step with the frequency of the a-c supply to the contacts. The excitation for the field of the synchronous motor is provided by means of selenium rectifiers. Since duration of zero period in a-c wave is very short to expand zero period of current in a-c wave, a special commutating reactor of saturable type is placed in each phase. The purpose of this reactor is to extend zero time on the a-c supply and thus to make breaking of a-c supply possible. It is very important for operation of the rectifier that zero stop on a-c supply is properly maintained.

Control equipment on both a-c and d-c parts must be occasionally inspected to avoid possibility of breakdown due to faulty contact; defective coils, etc. Power supply to the mechanical rectifier must be adequate, and occasional inspection of fuses might show presence of undesirable conditions which can be eliminated before any serious trouble will occur.

The series of pictures illustrated above show step by step application of preventive maintenance measures to a 20 kw mechanical rectifier.

Two units of the 20 kw capacity provide d-c power supply of 250 v in this installation. The a-c side is supplied by 208 v a-c, 3 phase, three wire. Figure 1 shows general view of the two rectifiers located adjacent to one another in a corner of a room. In the foreground can be seen a voltmeter and cathode ray oscilloscope that are used to test the rectifiers.

Figure 2 shows view of one mechanical rectifier cubicle with open door. On top left hand side of unit can be seen contact making mechanism. Synchronous motor occupies adjacent position on the right hand side of the upper section. The bottom part shows control equipment and circuit breakers supplying current to the rectifier.

Figure 3 is a view of the contact making mechanism. The contacts are located in the center (black) section of the unit and moving parts actuating the contacts are located in the bottom section. The oil level can be seen in the little opening at the bottom of the unit. This picture also shows a handle on the crank by means of which the proper voltage regulation is accomplished.

Figure 4 shows contacts after removal of the protective cover, made of horizontal ribs to provide necessary rigidity and cooling effect for the rectifier. Each contact has a number assigned to it, visible in this picture.

(Continued on page 164)

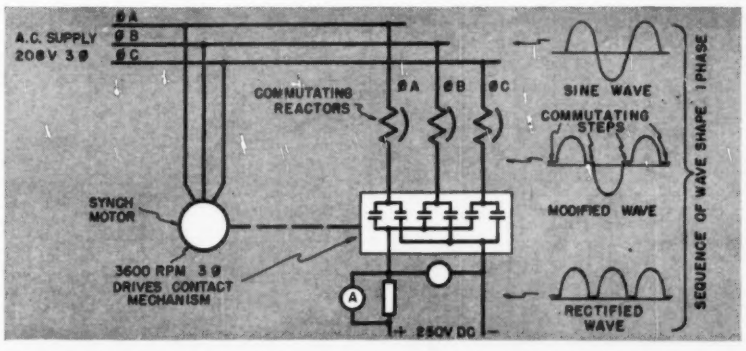


Fig. 13. When three phase alternating current input is used, full wave rectification is accomplished by the arrangement shown in the schematic drawing above

Completion Technique Improves Ground Water Flow, Saves Power

Engineering study of underground water flow connected with water wells pays dividends . . . Technique described in the article has successfully increased well production

By JOHN B. MILLIS, Consulting Engineer

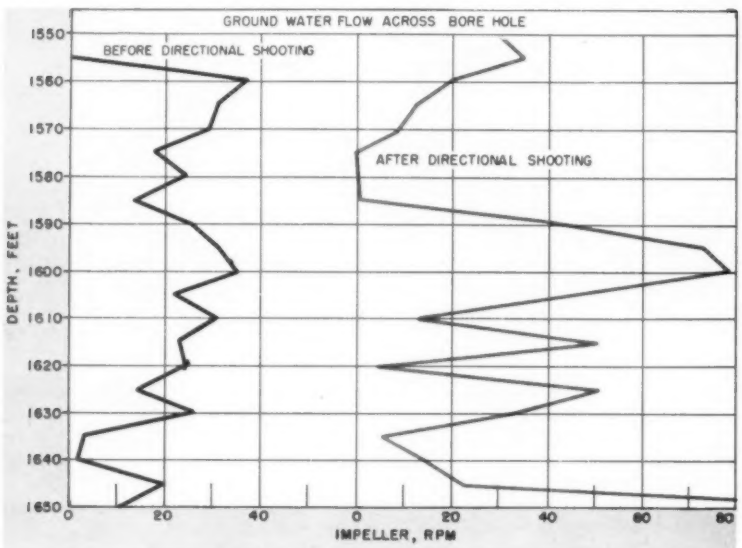


Fig. 1. A marked difference in cross-flow is evident after directional shooting

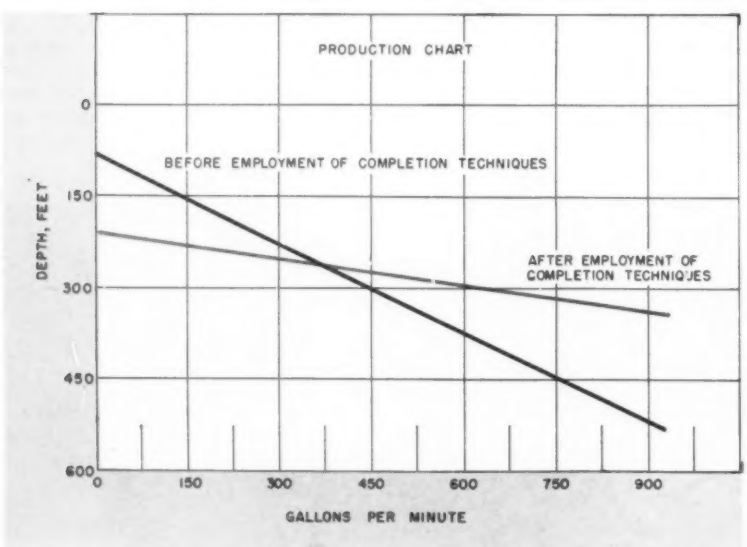


Fig. 2. Right side of chart shows same volume can be pumped with less effort

FROM THE FIRST well drilled through the sandstones in the middle north Central States, possibilities of a sizable ground water supply were realized. The magnitude and productivity of these formations have been known to geologists for decades, but development has depended on progress in the area.

The structural theory of these formations indicates that a few of the present completion techniques can be successfully employed. The results of these operations are: (1)sustained and/or increased production; (2) higher rates of in-flow; (3) modified radius of influence.

Conveyance of these various waters is through natural conduits such as crevices, solution channels, interstices, or other connected formation voids.

Ground water movement through these conduits is the result of pressure and velocity and is, by nature of the formation, restricted, causing the rate of flow to be low.

Bore hole construction, common to the area, consists of conductor pipe through the overburden followed by surface pipe set and cemented at a lower elevation. From base of surface pipe to final depth, the hole is open except for a possible liner through a short section of lower shale formation.

A current technique which has application for both new wells and workover jobs is a pattern of shots discharged into the producing formation and followed by formation acid treatment. Such a procedure would include the following: temperature log, caliper log, water movement survey, plus the examination of the engineer's well log. This data will point out mechanics of the bore hole construction and the hydrologic condition of the well. This forms the basis for effective employment of this completion technique.

The temperature log indicates the exchange of waters between the ex-

posed formations and, in some incidents, reveals a thieving formation.

Figure 3 is a caliper log of sandstone formation before and after a pattern of directional shooting showing the results of bore hole enlargements. Notable features in this case are: increase of the diameter by several inches, definite increase in sidewall penetration, and a greater drainage area.

Figure 1 is a water movement survey. A test impeller was lowered in the well and its revolutions per minute were noted at 5-ft intervals through the 100 ft of formation which was directionally shot. Prior to the shooting (left-hand column) the total reading was 414 rpm, then after shooting (right-hand column) the total was 634 rpm, indicating a 34 per cent increase in rate of flow across the bore hole. Such a change, in this case, represents an increment of 260 gpm.

Acid treatment following directional shooting, applied to these wells, will re-open crevices and dissolve certain chemicals whose deposition to the bore hole face impede the natural inflow of water. During construction of a well, extra limestone and dolomite samples should be collected and analyzed for solubility. Figure 4 shows results of such an analysis. With this data at hand, locations for acid stages can be intelligently selected. When acid is introduced by high pressure methods, such information is a "must" prior to successful operation.

Figure 2 is a production chart showing conditions before and after use of these completion techniques. A production line with a steep slope denotes restricted inflow conditions. A line with a less steep slope signifies more free movement of water into the bore hole.

The production of water from a well causes a variation "feet to water below surface" between the non-pumping level and the pumping level; therefore all development methods should be evaluated upon a favorable change in pumping level.

In particular regard to the data in Fig. 1, the water level was located 532 ft below surface while pumping at the rate of 930 gpm before workover and 343 ft below surface after workover, or a reduction in lift of 189 ft. A saving of approximately 945 kwhr per million gallons pumped will be realized.

Observations indicate these large wells usually have an average annual production of 250 million gallons; therefore, if kilowatt hours cost one cent each, a yearly saving of about $2300 can be expected in reduced power cost.

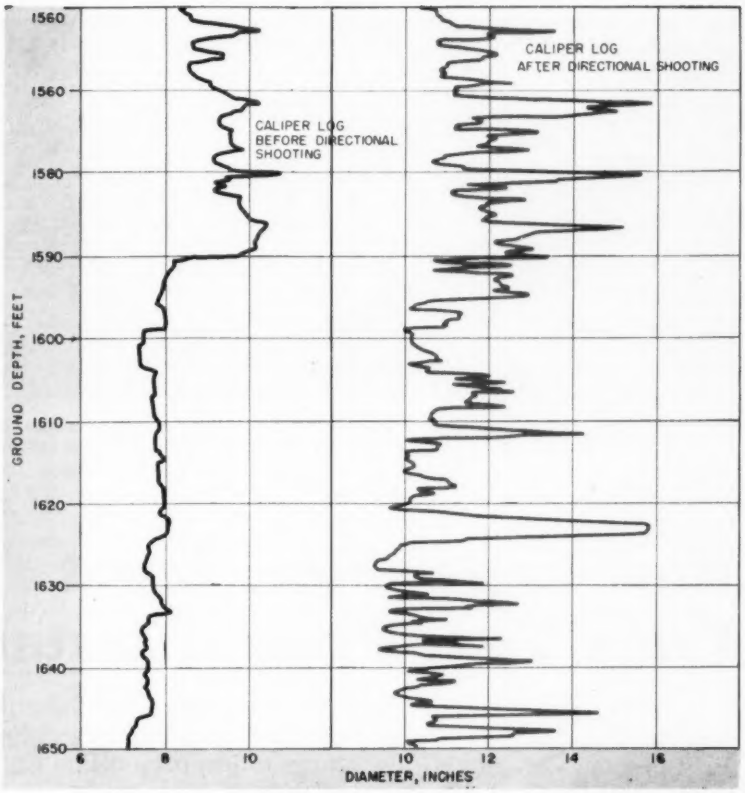


Fig. 3. Caliper log comparisons reveal enlargements of bore hole diameters

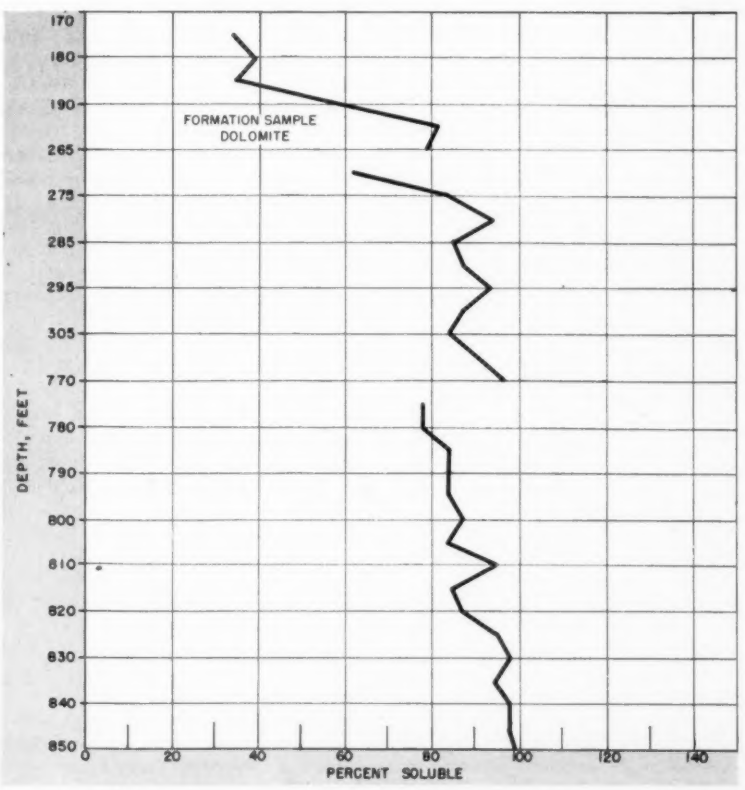


Fig. 4. Graph guides acid treatment by showing solubility at various depths

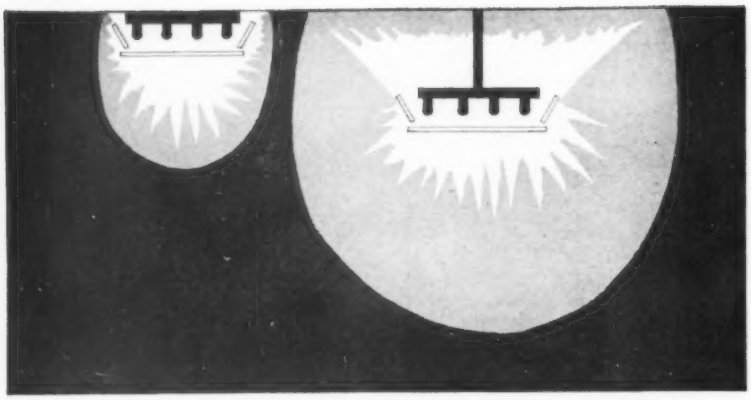


Fig. 1. Fixture, left, is too close to the ceiling. More uniform illumination is possible in the second illustration by lowering the fixture well below the ceiling

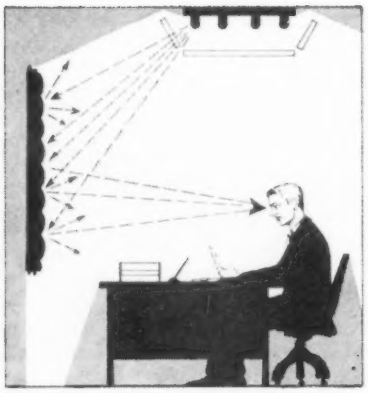


Fig. 2. Distracting reflections can be corrected by frosting the panel surface

How to Get More Light From Your Present Installation

Are you getting the best illumination from your present lighting installation? . . . Several simple, yet inexpensive, ways to improve office and plant lighting are suggested

By JOHN G. HOWELL, JR., Electrical Engineer

MOST SITUATIONS which confront a plant engineer are inherited either from a predecessor or from the people who designed and built the plant that he is called upon to maintain. One of these situations is the problem of providing adequate lighting for the plant office workers without spending any money, and this one can really plague the plant engineer if the office lighting has been neglected.

A poor office lighting job can be the cause of headaches, low personnel efficiency, dissatisfaction, etc., and its correction is just as important to the over-all plant operation as good plant maintenance. Here are several suggestions on how office lighting can be improved with a minimum of expense.

First Check Walls and Ceiling

First approach is to look at the ceilings and walls. Can they be whitened and brightened up? If so, this will cost but a few gallons of paint and the labor to apply it. A room with a dingy brown ceiling and gray walls which is either the result of smudge from poor ventilation or someone else's idea of interior finishes can overnight become a pleasant place in which to work by simply repainting the ceiling and walls. Eggshell white is very acceptable for the ceiling, while the same paint with a slight tinting color added to it, either blue, green, or even pink, will do wonders to the walls.

Next, look at the fixtures. Are there any bare or exposed lamps or tubes? The surface brightness of an unshielded bare lamp or tube is quite high. This can be very objectionable if any fixture with a bare lamp or tube is within the normal line of vision or if they can be accidentally viewed by reflection from some bright object such as the keys and chrome trim of office equipment.

While such fixtures should preferably be replaced at the first opportunity, there are available reflectors and diffusers of various shapes which can be fitted over bare lamps or tubes to either shield and/or diffuse the light and so reduce the brightness ratio. These will often suffice until a more thoroughgoing program permits replacement of the fixtures.

Fluorescent fixtures with louvered bottoms, commonly called "egg crates" can be a source of complaint. The undiffused light of the tubes that shines through can produce objectionable specular reflection from many types of modern business machines. On the other hand, such a fixture may be quite acceptable in any office where there are no objects to produce such reflections.

Perhaps the plant engineer can work out an exchange of fixtures by putting louvered bottom units where they are acceptable and installing the diffuser bottom type where there is a problem of specular reflection. If no exchange is possible and the louvered bottom fixtures are the cause, it is very possible that the fixture manufacturer has glass or plastic bottoms available as replacements at a nominal price. As a quick and even lower cost measure, sheets of tracing paper placed on top of the louvers will serve satisfactorily as diffusers until replacements are possible.

Is Fixture Close to Ceiling?

Sometimes the fixtures may be mounted too close to the ceiling, and therefore cannot distribute enough light across the ceiling for reasonably uniform illumination. In such cases improvement can often be achieved by installing extension brackets that will drop the fixtures 8 to 12 in., and/or by installing additional fixtures to light up the dark ceiling areas. Most of the newer styles of ceiling-mounted fixtures generally have good light distribution across the ceiling; on the

other hand, some of the early fluorescent fixtures of the ceiling mounted type had poorly shaped side diffusers.

Replacing these diffusers with a shape that directs more light across the ceiling will bring a decided improvement and so eliminate the "third degree" effect that these fixtures give by trapping much of the light between the fixture and the ceiling. This results in islands of high brightness over areas of darkness and produces a condition that neither the eye nor mind finds comforting. Where the effect is very pronounced, installing additional fixtures as well as lowering them may be necessary.

Another problem which may fall to the plant engineer is that of too much reflection from the vertical surfaces of walls, windows and glass enclosures. For example, one new office was recently finished with panels of fluted glass to form the upper part of the enclosures for semi-private offices. The reflection in these fluted glass panels was brilliant and dazzling as well as a distraction to those who, by force of circumstances, had to face them. Such a condition can be corrected by frosting the surface of the panels by sand blasting, or they can be acid etched or simply sprayed with a frosty emulsion.

Other Factors to Consider

Other steps to improve the lighting situation include the refurbishing of the office furniture in lighter tones as a backlog job for the plant engineer's carpenters. Such a program will eventually result in an over-all improvement in attractiveness of the office, as well as efficiency lighting.

The dark green composition tops of the older furniture can be replaced with light green, gray or tan materials. These lighter shades of material have less contrast with the normal brightness of the papers than the older dark green tops, hence there is less eye fatigue. As the desks are worked over, the plant painters can take on the job of respraying the filing cabinets and tables as well.

If the ceilings and the walls are continually being smudged by adjacent supply ventilators a thorough check on the ventilating system may be necessary to maintain adequate reflectivity of these surfaces for optimum lighting. Perhaps the dust filters are being partially bypassed, or oil from a fan bearing is being drawn into the system. While complete elimination of smudging is not always practicable, short of installing a very elaborate filtering system, nevertheless, a low cost solution is to replace the ceiling supply grilles with a type in which antismudge rings can be incorporated. These provide a surface on which most of the smudge is deposited and which can be subsequently wiped clean, when necessary, without the need of repainting the entire ceiling. The cost of these fittings can be quickly repaid by lowered office repainting costs.

Plant Engineer Improvises Drum Crowning Device

By R. B. GILRAY, Plant Engineer, Motor Products Corp., Detroit

AT ONE TIME, belt conveyor drive and idle drums were made in our carpenter shop. This was possible when we had a lathe large enough to turn these drums. It took us six hours per drum at a cost of approximately $3.00 per hour. However, since this lathe was scrapped, we have relied on an outside source to crown drums.

With the cost for this operation ranging from $45 to $60 per drum, the thought of devising some means of doing this in the shop was irresistible.

By C-clamping two pillow blocks to saw horses, and running a belt directly to the drum from a small wood lathe, Fig. 2, it is now possible to crown these drums right in the shop.

With this unusual set-up, we have been able to make four units in one eight hour day at a great savings.

Fig. 1. Author and workers check the performance of drum crowning device

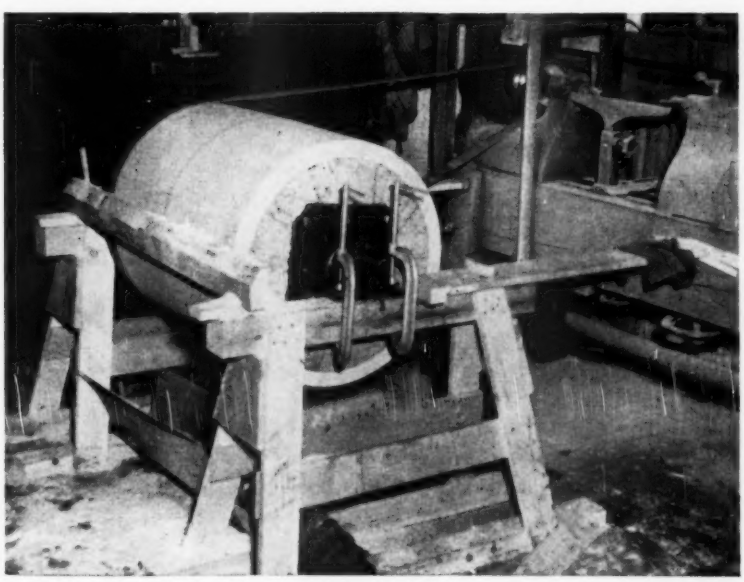


Fig. 2. Improvised by the plant engineer, device consists of two pillow blocks clamped to saw horses with a belt running to the drum from small wood lathe

In Tank Truck Loading . . . Collapsible Walkway Adds Safety

By C. T. TURNER, JR., American Oil Company

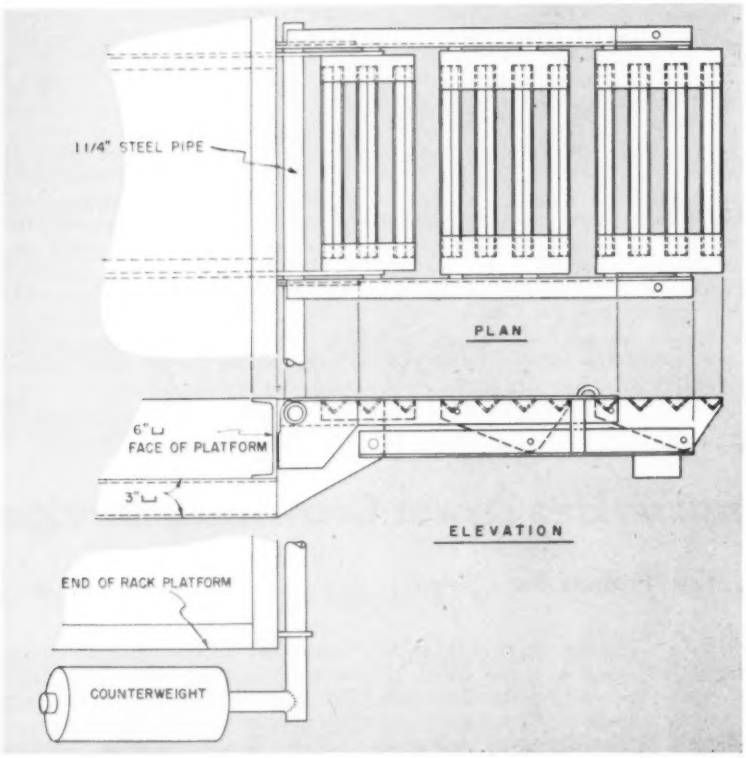


Fig. 1. Working drawing of collapsible walkway shows construction detail

TANK TRUCK loading platforms at the plants of the American Oil Co. are equipped with "collapsible" walkways that provide safe footing for personnel engaged in the loading operations.

The walkways are fabricated from standard structural sections, and welded for strength and durability. Bolts are used only at the pivoting points. An outstanding feature of the walkway is the phase of its design which provides that the treads remain horizontal, regardless of the angular position of the walkway. Safe, sure footing is therefore provided for loading personnel, working on any height truck.

A counterweight on the shaft offsets the weight of the platform, to facilitate raising and lowering the walkway. Where there was insufficient room for the counterweight under the platform, it was placed at the end of the platform, as shown in the drawing, on an extension of the shaft.

The treads of the walkway, constructed of angle iron, are installed with the apex down, to permit filling them with a non-slip adhesive as an additional safety feature, particularly valuable in wet weather when the metal treads would be slippery. A wooden bumper can be added at the outer end.

Fig. 2. Walkway in raised (collapsed) position. Minimum extension into roadway permits easier entry of tank truck

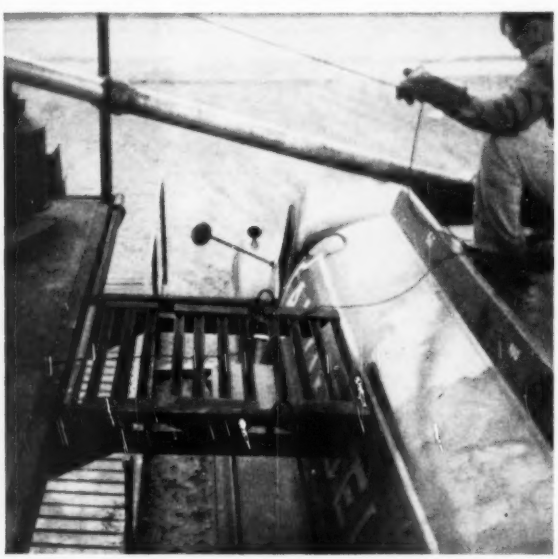


Fig. 3. When tank truck is in position for loading, walkway is lowered into horizontal position, providing access for loader

In Tank Car Loading . . . Safety Walkway Is Retractable

By C. E. KEMP, B. F. Goodrich Chemical Company

INCREASED SHIPMENTS of chemicals by rail tank car at the Calvert City, Ky., plant of the B. F. Goodrich Chemical Co., had put added emphasis on the tank car loading operation.

"Retractable" walkways were constructed as additions to the loading platforms, for the safety and convenience of the operators. For an additional measure of safety, handrails were added, designed to pivot with the walkway as it was raised or lowered by the operator on the platform.

The walkways were fabricated of structural channel, and floored with steel grating. Counterweighting was accomplished by constructing a box on the inboard end of the walkway and filling it with scrap steel to bring the entire walk into balance. Experience showed that the counterbalance should be left about 25 lb lighter than the walk itself, to hold it in position when it was extended and resting on the tank car. Without the added weight, the walkway had a tendency to rise and fall with any stray gusts of wind, since no locking device was used.

The handrails, added in deference to the long span of the walkway, are constructed of 1½-in. stainless steel tubing, with stainless steel pins through brass bushings at the pivot points.

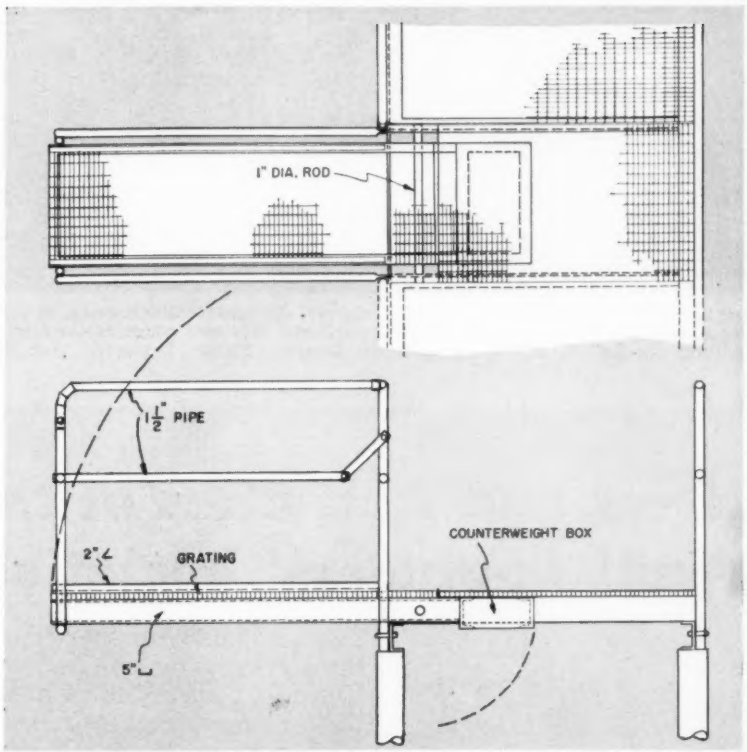


Fig. 1. Plan and elevation views of walkway show its relation to platform

Fig. 2. Author raises walkway to retracted position by means of line attached between end of walkway and railing

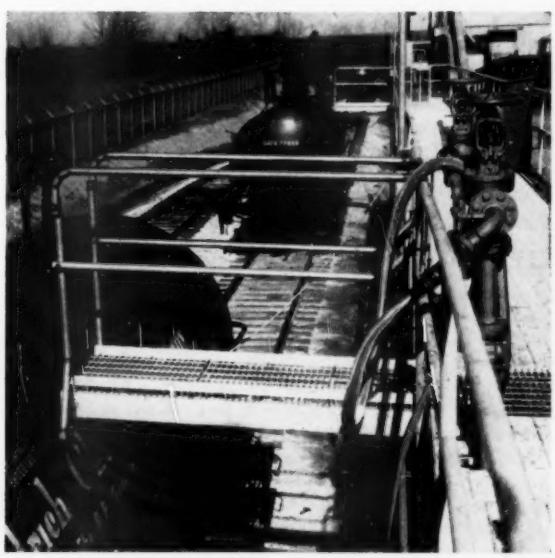
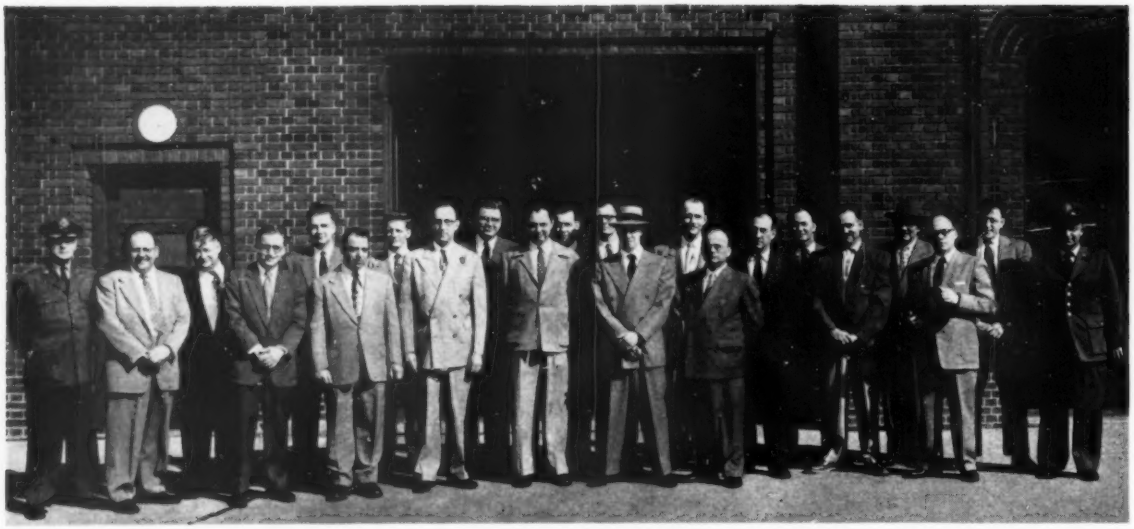


Fig. 3. Walkway in horizontal position, for operator's access to tank car. Hand railing provides added operating safety



Dayton Plant Engineers' Club before one of the many fire stations at Wright-Patterson Air Force Base. Men in uniform are Col. R. H. Morris, Editorial Director, Plant Engineering, at left, and Major S. M. Castelluccio, project officer of the tour, at right. Members of the Dayton Plant Engineers' Club touring the base are identified below

News and Activities of the Plant Engineers' Societies

Dayton Plant Engineers tour Wright-Patterson Air Force Base . . . Symbol of Detroit group . . . New officers for Chicago, Calumet Region, Milwaukee and Niagara Frontier . . . New York group tours Worthington . . . Cleveland Society conducts Plant Engineering Conference

TWENTY MEMBERS of the Dayton Plant Engineers' Club spent an afternoon and evening at Wright-Patterson Air Force Base on a plant visit concerned primarily with the activities of the Installations Officer and his department.

Dayton Tour

At an Air Force installation all plant engineering activities come under the Installations Officer and Colonel L. C. Howell, Director of Base Installations, started off the afternoon program with discussion of the Base, its physical arrangement and the responsibilities and duties of the department to the base commander and to the many tenant organizations that are accommodated there.

Major J. A. Saathoff, Deputy Director of Installations, later described in detail the organization of the department, the paperwork and operation of the department for a range of activities from a major engineering project to a minor maintenance project. Following the orientation session, Major S. M. Castelluccio, project officer for the tour, accompanied the party and explained the operations at many of the laboratories, shops, hangars and fire stations.

Following the tour there was a Questions and Answers period which brought out many details of the various shop operations, job descriptions and job analysis and the very excellent preventive maintenance program which the services have developed. In the evening the Dayton Plant Engineers' Club was guest of Col. Dick Morris, Editorial Director of PLANT ENGINEERING, who was on active duty with the Air Force at Wright Field at that time.

Identification of men in the photograph above are, left to right: Col. R. H. Morris, Editorial Director, PLANT ENGINEERING; E. Wray, Airtemp Div., Chrysler Corp., E. D. Tait, National Cash Register Co.; J. S. Preffinger, Standard Register; J. Randolph, Duriron Co., Incorporated; and J. E. Bauer, Sucher Packing Co.

R. R. Reimer, Morris Bean & Co.; J. H. Harrington, Univis Lens Co.; J. Burnham, Cooper-Bessemer Corp.; D. Smith, Duriron Co., Inc.; C. J. Stanley, Standard Register.

R. G. Hill, Gummed Products Co.; R. Lennox, Hobart Mfg. Co.; W. H. Hahn, McCall Corp.; G. E. Miller, Frigidaire Div., GMC; C. E. Kohl, Harris Seybold Co.; B. L. Merriss, Oxford Miami Paper Co.

F. Detrick, Precision Rubber Products; V. A. Kahl, Moraine Products Div., GMC; H. Fitzpatrick, Stone Container Co.; M. B. Proctor, Leland Electric Co.; and Major S. M. Castelluccio, project officer of the tour.

Chicago

Ted Ramond, plant engineer at Goodman Manufacturing Co., and a member of the Chicago Plant Engineers' Society, gave a talk at one of the Chicago meetings on "Duties and Scope of a Plant Engineer."

At this meeting, final results of their

recent election were announced: H. B. Zoeter, Continental Can Co., Inc., was elected president; M. T. Anderson, Shakeproof Division of Illinois Tool Works, was named vice president; K. N. Banthin, The Visking Corp., will be the secretary-treasurer. Senior Board member is John Balla, Western Felt Works; Junior Board Member is C. A. Lamb, American Forge Div. of American Brake Shoe Co.

Detroit

Recent meetings and announcements of other activities of the Plant Engineers' Society of Detroit have been

appearing on the Society's stationery.

We thought plant engineers from the other societies would be interested in seeing the symbol they adopted. The letterhead consists of this symbol with the wording "Plant Engineers' Society of Detroit" following it.

Cleveland

Two panel sessions were arranged by the Plant Engineers' Society of Cleveland for one of their recent meetings on the subject of preventive and plant maintenance at the Annual Plant Engineering Conference held at the Cleveland Engineering Society.

Members of the afternoon session, who discussed the subject "Preventive Maintenance of Plant Equipment," consisted of: Howard Rhea, Warner & Swasey Co.; A. D. Bushman, Perfection Stove Co.; W. Hensel, Thompson Products, Inc.; D. W. Tombaugh, Chevrolet Motor Div., GMC; and N. K. Conrad, Ford Motor Co.

The evening session was paneled by the following plant engineers: W. J. Collier, Thompson Products, Inc.; L. Wilson, Graphite Bronze Co.; E. J. Wagar, Industrial Rayon Co.; and M. Degley, Ferro Machine and Foundry, Inc. Subject for the evening session was "Plant Maintenance and Engineering in Cleveland Industry."

Calumet Region

Annual meeting of the Plant Engineers of the Calumet Region, held at Phil Schmidt's Restaurant, included an election of officers for the coming year in addition to their regular business meeting and discussion.

Officers for the 1954-1955 season will be: Otto Seidl, Combustion Engineering, Inc., president; Cliff Leisure, E. I. du Pont De Nemours & Co., vice president; and Arthur W. Terry, Keyes Fibre Co., secretary-treasurer. Members of the Board of Directors will be W. V. Kaun, Cities Service Oil Co. and A. J. Schuler, U. S. S. Lead Refinery, Inc.

Milwaukee

Annual meeting and election of officers of the Plant Engineers' Society of Greater Milwaukee was recently held at Hindman's Restaurant.

Officers elected for the coming year were: W. J. Thuerman, Chain Belt Co., president; R. G. Zarling, American Motors Corp., vice president; and F. Trubschaw, Galland-Henning Mfg. Co., will serve as secretary-treasurer. Board members for the new year will be E. Nygren, Ben Hur Mfg. Co. and H. Fansler, Bucyrus-Erie Co.

Included on the program was a brief talk by R. Marsek, Maintenance Service Co., on machine tool repair. He discussed the points to consider before making repairs on an old machine to determine if repairs or replacement is the most economical approach. Several points to consider are: (1) The age of equipment; (2) What is the condition of the machine; how badly is it worn? (3) To what extent will it be used in the plant? He suggested that serious consideration of the answers to these questions should help you decide whether to replace or repair the equipment.

Niagara Frontier

At the final meeting of the first year of the Niagara Frontier, consisting of plant engineers from the Buffalo and Niagara Falls areas, members elected officers for the coming year.

R. J. Hess, Merchants Refrigerating Corp., was elected president; 1st vice president will be G. E. Kamerer, Sylvania Electric Products, Inc.; 2nd vice president is H. Loewer, Moore Business Forms; W. E. Gillman, Ford Assembly plant, will serve as secretary-treasurer. Members at large for the coming year will be R. Fowler, Titanium Alloy Mfg. Div. and E. Trautman, Sylvania Electric Products, Inc.

Retiring president Paul Haag of the Kimberly-Clark Corp. was chairman.

New York

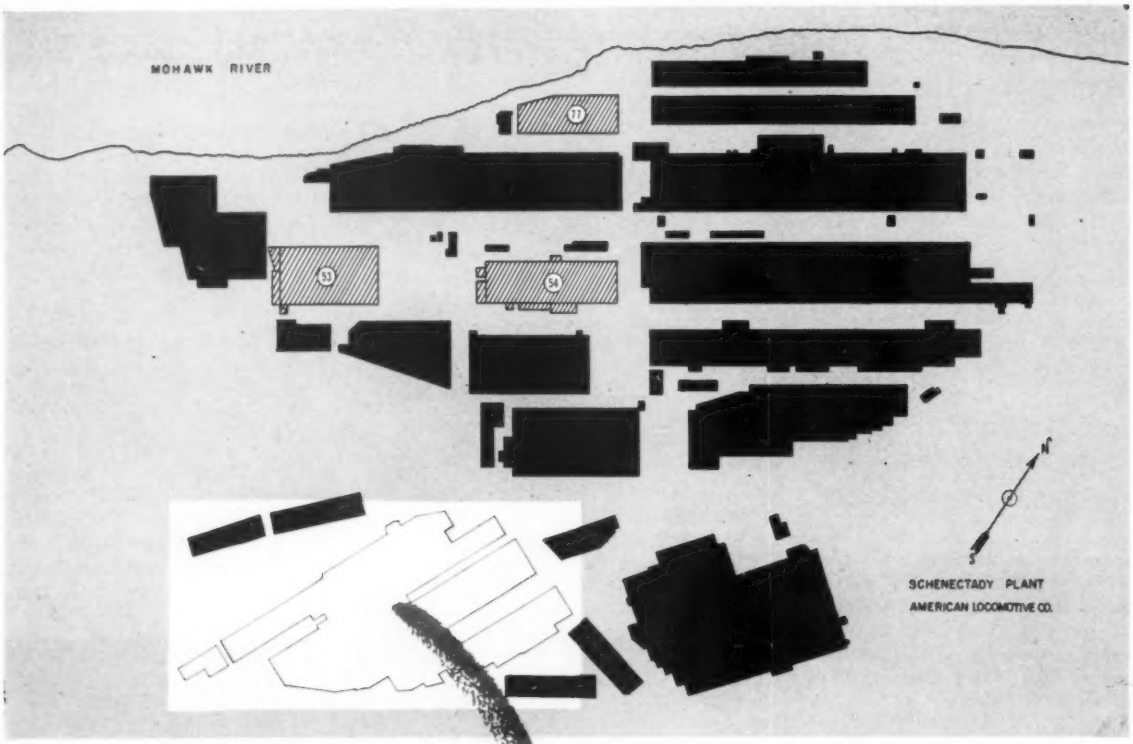
Forty-five plant engineers of the New York Plant Engineers' Association recently toured the Harrison Works of Worthington Corporation. A. J. Rogowski, Manager of the Engineering and Construction Department, acted as host to the group on the tour.

S. Blanchard of Worthington Corp. points out a portion of the new production-run testing facilities in the hydraulic test laboratory to members of the New York Plant Engineers' Association. Left to right are: S. Blanchard, F. McDermott. R. Leaver, E. Holt, C. Avignone and T. Fitzgerald, all of Lever Bros.

After a welcoming talk by Mr. Rogowski and a presentation of Worthington's standard end-suction centrifugal pumps by Paul G. Hooper, guides ushered the group on an inspection tour of the machine shop, erection and welding shops, research laboratory, power house and foundry.

Highlight of the visit was the tour through the company's new hydraulic proving ground.

This included the new test stand facilities which enable production-run testing of the various types of pumping equipment, centrifugal compressors and many other types of units.



Modernization Program at Alco Makes Idle Buildings Hum Again

There is still a great deal of service left in those idle buildings . . . Alco discovered this when it modernized thirteen idle buildings . . . The problems encountered and solutions may be of interest to other plant engineers

By **A. B. WATERBURY**, Assistant Chief Engineer, Walter Kidde Constructors, Inc., and **E. T. DeFOREEST**, Plant Engineer, Ordnance Division, American Locomotive Co.

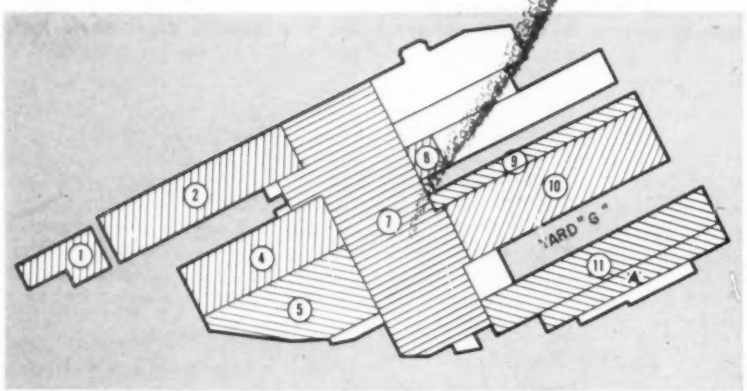


Fig. 1. Cross-hatched buildings shown in this illustration and at top of page were modernized to meet the company's need for additional space for tank production

MODERNIZING 13 old buildings, formerly used by the American Locomotive Co., Schenectady, New York, for steam locomotive production and assembly, into a mechanized, integrated, highly efficient tank assembly plant can present quite a few problems.

However, this job was tackled and successfully completed by Walter Kidde Constructors, Inc., within a period of five months covering both design and construction. The numerous problems they encountered and their solutions may be of interest to other plant engineers.

Alco's main ordnance shops cover an area of 300,000 sq ft. Built to support the concentrated weights and

stresses demanded in steam locomotive production, these shops were ideally suited to the assembly of heavy ordnance equipment.

First job was to consider the general design and engineering problem of developing new assembly, finishing, storing and shipping facilities so as to make maximum use of existing facilities and equipment. At the time this job was undertaken, the problem was greatly complicated by critical shortages of steel and other materials, coupled with an extremely tight construction schedule.

On-The-Spot Engineering

It was at once realized that normal home office design procedures were out of the question. A complete field engineering department was set up and this group, working in close contact with the construction forces, made detailed surveys and complete architectural, structural, mechanical, electrical, heating and ventilating designs. Wherever possible, steel was replaced by timber or reinforced concrete. Field expeditors were used to chase down and follow materials and equipment.

First construction requirement was loading and unloading docks and storage space. For this purpose the former smith shop, Building No. 54, was turned over to the contractor. It had a dirt floor interrupted with massive foundations for old steam hammers. This building was transformed into a warehouse, requiring a heavy duty floor at truck and railroad platform height.

The decision to raise the floor approximately 3 ft 8 in. posed the problem of reinforcing the existing walls to take the new lateral thrust due to the fill and a 1000 psf surcharge. It was solved by constructing an inexpensive gravity retaining wall inside the brick wall. This wall was stepped to save concrete and greatly simplify formwork—the steps being keyed and dowelled together. The fill was of gravel, less costly than borrowing earth fill, and less apt to crack the floor through settlement. It was placed and rolled in 6-in. lifts. The floor slab is 8 in. thick, reinforced with heavy mesh top and bottom. There has been no evidence of distress in the brick walls nor of cracking of the slab.

Loading to and from trucks is done at double truck wells inside of each end of the building. A railroad loading platform was constructed along one side.

Principal tank assembly operation was to be performed in buildings No. 7 and 11. The first of these was ideal for the purpose—large, light and well-equipped with cranes, which will be described later. The second had been unused for some time and did not look promising. The floor level was too high, there were numerous massive machine foundations which would have to come out, craneways to be extended, large door openings to be cut.

A drag chain conveyor system was planned for the assembly line in building No. 7. It would tow partly assembled tanks on dollies running on steel rails. The chain was to be housed in an H-section slot, running in the upper section and returning in the space below the cross bar of the H. The top of the slot was to be flush with the existing floor. Along the line a shallow motor tightening pit was required to provide crawl space for men working on tank motors underneath the tank bodies. The drive for the conveyor was recessed below floor level.

It seemed a small matter to recess the conveyor and tightening pit in the floor until it was found that they diagonally crossed an existing 8- by 10-ft arched brick and stone storm sewer, the top of which was less than 3 ft below the floor level. The problem was solved by first carrying concrete bearing walls down on either side of the sewer. Across these walls heavy steel beams were placed on 6 ft centers, at some points cutting into the sewer arch. An 8 in. reinforced concrete slab spanning between these beams formed the floor of the pit. The sewer was thus relieved of all loads from the assembly line. The rest of the floor of building No. 7, which was formerly criss-crossed with railroad tracks and pits, was patched and filled in and finally levelled to the highest point by a special asphalt mix.

To bring the floor of building No. 11

Fig. 2. This is how building No. 10, formerly used as a rod shop, looked before the facelifting took place. Note the row of windows along the right side

Fig. 3. Here is how it looks after being completely transformed into a receiving area and warehouse. The windows looking out on Yard G have been bricked in

Fig. 4. This is a before view of building No. 11, formerly the wheel shop, looking into building No. 11-A, the old axle shop

Fig. 5. After building No. 11 was cleaned, a new floor installed and interior freshly painted, this is how it looked

to the same elevation as adjoining building No. 7, it was bulldozed out to a depth of 2½ ft, brought up to level with sand carefully rolled, and then covered with an 8 in. heavy mesh reinforced slab.

Openings Cut in Wall

To provide an exit from this building for the assembled tanks at the end of the assembly line, it was necessary to cut three openings, 18 by 18 ft, in the old end wall 65 ft wide and 50 ft high. Temporary steel "needles" were put through the wall 3 ft apart, carried by 12- by 12-in. shoring on each side of the wall. The wall was then removed below the needles, new footings, steel columns and piers (depending on available space) provided, steel lintels set, and bricked up to the old walls above the needles. Finally, rolling steel doors were installed after the temporary shoring was removed.

An unusual feature of this project was the fabrication, on the job, of these lintels and most of the miscellaneous steel required. This resulted in the saving of a great deal of time, due to the extreme shortage of steel during the construction period. The purchasing department kept in touch with all steel suppliers in a large area, and rolled shapes and plates were secured and assembled from many sources.

Yard G, shown on the diagram, was formerly an open yard area between two buildings. It was traversed by a heavy bridge crane, the crane rails and girders carried on steel A-frames along the side walls. The yard was covered over to provide additional operating space, a railroad siding, and unloading platform accommodating 5 cars at one time.

The new roof is of wood plank on timber bowstring trusses carried on steel columns. These columns on one side are in the yard, just outside the crane supports. On the other side, however, it was found necessary to place these columns inside the adjoining building, setting them down through the existing low roof. The spacing of the columns and trusses had to be arranged to miss crane supports, building columns and other obstructions. The result was an irregular spacing, varying from 14 to 20 ft.

Concrete footings for supporting the roof columns were poured between the exterior of the adjacent building and the crane framing. Because of the small clearance, extreme care was required during the installation of the columns, which were hoisted above the crane framing and then lowered into place through holes cut in the roof of the existing building.

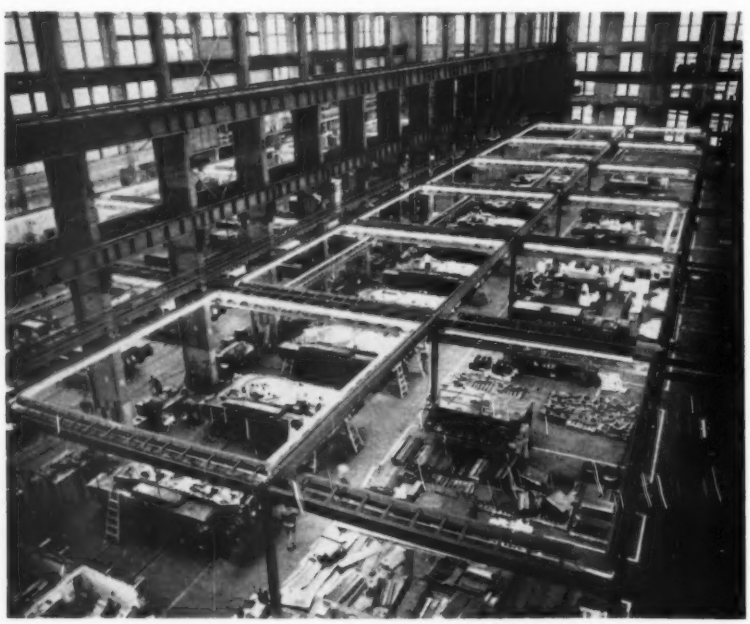


Fig. 6. This view looks down on one-half of building No. 7, which is the main assembly area. Note the fluorescent lighting fixtures installed on the craneways

Roof Covers Yard Area

The columns were tied together with steel framing longitudinally. The wood bolstering trusses for the yard roof, spaced with the columns and tied to them with steel ties, were then erected and covered with planking. The columns were further secured with lateral X-angle bracing installed below the wood trusses and fastened to the columns.

One-third of the second floor of Building No. 2 is used for spare parts for tanks. It was important to have a floor in this section which would resist oils and waxes. All of the second

floor was formerly covered with wood flooring over steel beams.

In the sections set aside for storing the spare parts, the floor was covered over with Hubbelite special cement. This was applied over the old flooring on top of chicken wire stapled to the wooden floor. A 5/8 in. spread was then applied.

The existing flooring on the first floor of this building was patched and repaired with creosoted blocks. The exception was in the telephone exchange area which was to be added. Here, after removal of the old floor, concrete was poured, flush with the surrounding blocks. A cinder block partition was then placed on top of the concrete slab. Room was provided for a 350-outlet telephone exchange, three-operator switchboard.

Materials Handling Equipment

In Building No. 2, a roller conveyor was installed to move the spare parts in buckets. These move up from the first floor on a belt conveyor and feed onto a roller conveyor, carrying parts to dip tanks and benches for hand-wrapping. At this point overhead conveyors carry empty baskets to the downstairs area.

Another roller conveyor, heavy-duty, was provided for handling completely filled boxes which had to be weighed and delivered to the belt conveyor which brought them downstairs to the shipping section.

Building No. 7, the assembly line area, was originally equipped with three 150-ton cranes, and six 20-ton cranes operating at a lower level. With no fundamental changes, therefore, the Ordnance Division had at its disposal a building well equipped to handle tank hulls as well as heavy engines and other components. The existing overhead cranes were utilized for removing assembled tank hulls from conveyor dollies and placing them on conveyor line for further assembly operations and for the return of empty conveyor dollies to the start of the conveyor line.

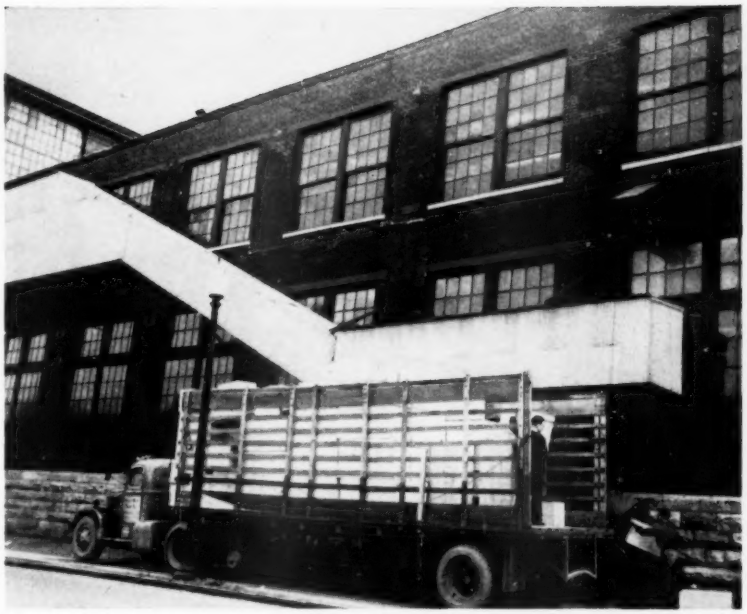


Fig. 7. Special ramp-conveyor installed outside the storage parts building receives cartons from the delivery trucks and conveys them to the second floor

Fortunately only two 150-ton cranes were required in the assembly line area. But the fact that there was an extra one saved at least 14 months—and possibly more—in equipping the new tank-modification and testing plant. So important was this consideration that the span for the modification building was purposely designed to accommodate the installation of the third 150-ton crane.

The building in which tank production lines are located, as now modified, has three levels of cranes: the two 150-ton cranes are at the top; the six 20-ton units below; and below these are 18 small 2-ton cranes. The small cranes are at the disposal of every two assembly stations all along the line. In addition, these stations are equipped with other modern materials handling devices, such as conveyors, fork trucks, and mobile dollies.

Instead of following standard procedure and assembling the tanks lengthwise, the tanks were turned sideways 90 deg and mounted on dollies. This arrangement permitted almost twice the number of work stations in the building as had been possible before.

The existing overhead cranes were

(Continued on page 164)

Fig. 8. View shows Yard G just after the unloading platform, at right, was built and before area was roofed over

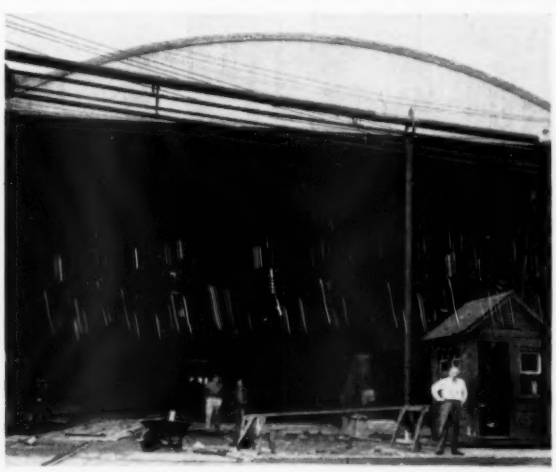
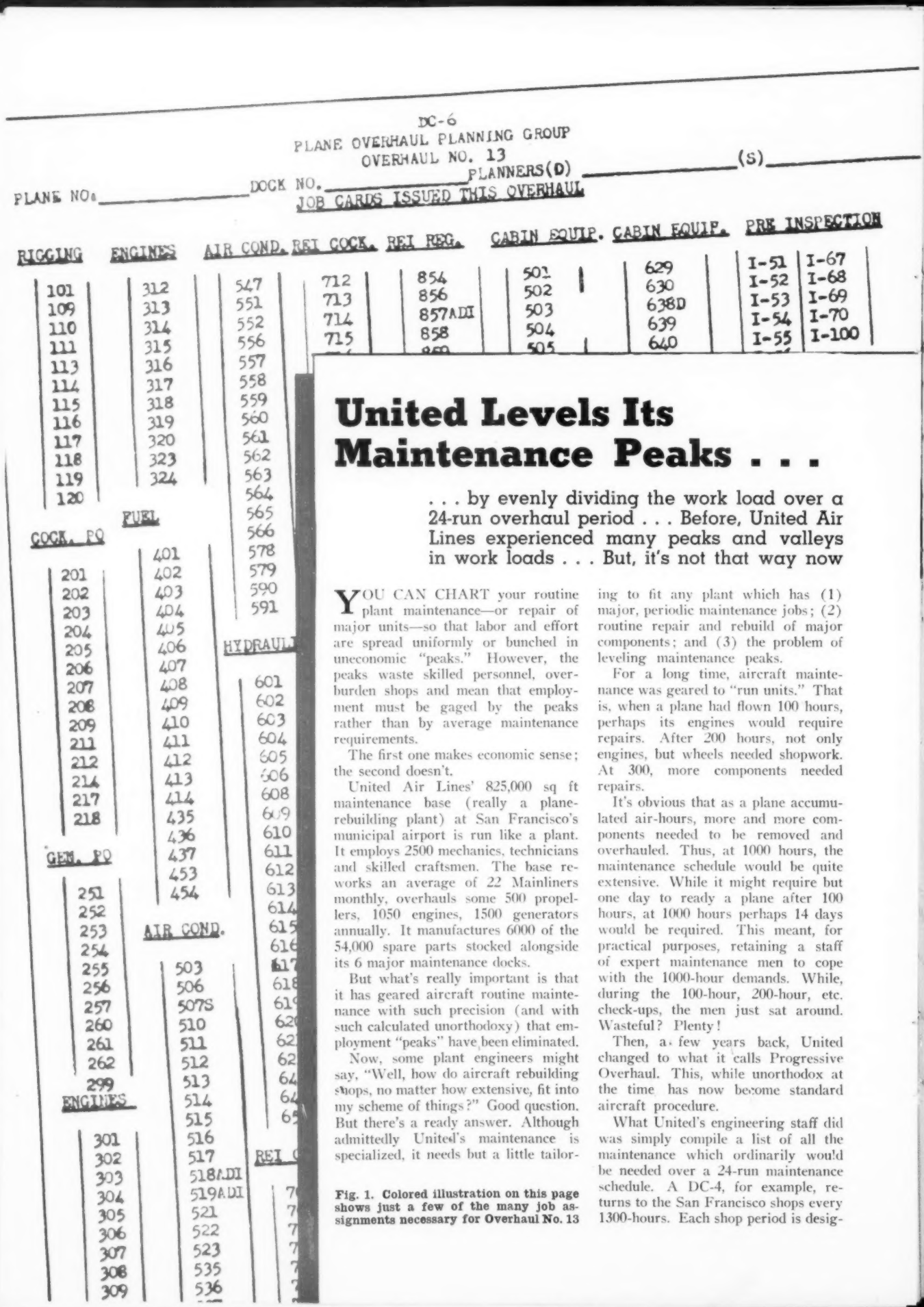


Fig. 9. Now, the completely roofed in yard looks like this, providing a weather-proofed area for unloading equipment



United Levels Its Maintenance Peaks . . .

. . . by evenly dividing the work load over a 24-run overhaul period . . . Before, United Air Lines experienced many peaks and valleys in work loads . . . But, it's not that way now

YOU CAN CHART your routine plant maintenance—or repair of major units—so that labor and effort are spread uniformly or bunched in uneconomic "peaks." However, the peaks waste skilled personnel, overburden shops and mean that employment must be gaged by the peaks rather than by average maintenance requirements.

The first one makes economic sense; the second doesn't.

United Air Lines' 825,000 sq ft maintenance base (really a plane-rebuilding plant) at San Francisco's municipal airport is run like a plant. It employs 2500 mechanics, technicians and skilled craftsmen. The base reworks an average of 22 Mainliners monthly, overhauls some 500 propellers, 1050 engines, 1500 generators annually. It manufactures 6000 of the 54,000 spare parts stocked alongside its 6 major maintenance docks.

But what's really important is that it has geared aircraft routine maintenance with such precision (and with such calculated unorthodoxy) that employment "peaks" have been eliminated.

Now, some plant engineers might say, "Well, how do aircraft rebuilding shops, no matter how extensive, fit into my scheme of things?" Good question. But there's a ready answer. Although admittedly United's maintenance is specialized, it needs but a little tailoring to fit any plant which has (1) major, periodic maintenance jobs; (2) routine repair and rebuild of major components; and (3) the problem of leveling maintenance peaks.

Fig. 1. Colored illustration on this page shows just a few of the many job assignments necessary for Overhaul No. 13

For a long time, aircraft maintenance was geared to "run units." That is, when a plane had flown 100 hours, perhaps its engines would require repairs. After 200 hours, not only engines, but wheels needed shopwork. At 300, more components needed repairs.

It's obvious that as a plane accumulated air-hours, more and more components needed to be removed and overhauled. Thus, at 1000 hours, the maintenance schedule would be quite extensive. While it might require but one day to ready a plane after 100 hours, at 1000 hours perhaps 14 days would be required. This meant, for practical purposes, retaining a staff of expert maintenance men to cope with the 1000-hour demands. While, during the 100-hour, 200-hour, etc. check-ups, the men just sat around. Wasteful? Plenty!

Then, a few years back, United changed to what it calls Progressive Overhaul. This, while unorthodox at the time has now become standard aircraft procedure.

What United's engineering staff did was simply compile a list of all the maintenance which ordinarily would be needed over a 24-run maintenance schedule. A DC-4, for example, returns to the San Francisco shops every 1300-hours. Each shop period is desig-

nated a "run." Thus, the work load was evenly divided over 24 runs—a total of 31,200-hours.

Of course, engineering specifications and CAA regulations figured into this. Suppose a hydraulic system, under CAA regulations, was required to be repaired every 10,000 hours. It would be scheduled for repair sometime before the elapsed time, but it might be pulled out during the first run—that is, at only 1300-hours. It doesn't matter when the work is done, so long as the elapsed hours between tear-downs do not exceed the specified time.

Now, the total workload was proportioned over this 24-run period. Work was adjusted so that the average time that any DC-4 spent in the shop during a "run repair" did not exceed 4 days of actual repair. This helped level out the peaks.

A work card was made up for every job scheduled during the entire 24-run maintenance period. Today, each run period means about 1000 separate maintenance jobs. Each job card tells a specific mechanic what work is to be done. For example, one of these many job cards may specify "Gage, supercharger duct pressure, replace." It may continue, telling the mechanic to: "(1) Remove supercharger duct pressure gage; (2) Install serviceable supercharger duct pressure gage." etc.

Also included on the card would be the stock number of the gage, so the mechanic doesn't have to resort to guesswork when he goes to the spare parts department. Another note tells him during which run-period (1st, 13th, 14th) this job must be done. Then, at the bottom of the card is a pre-printed time-estimate, divided into 15-minute increments.

How Work Is Scheduled

Now, with this procedure in mind, let's see how the system operates.

On a master airplane overhaul schedule (could just as well be for materials handling equipment, over-the-road trucks, plant cranes), the date that specific airplanes are due to arrive at the base is noted.

Suppose that the master sheet indicates that plane number 6022 will arrive three days hence at Dock 6 for overhaul. The first digit, "6," indicates that the plane is a DC-6, while the last two digits are the last two numbers of its CAA number. Consulting a maintenance plan for DC-6 6022, the Overhaul Dept. notices that this is the 12th overhaul "run" period.

Next, the department gets out an "Overhaul No. 12 Schedule" for this particular type of aircraft. This sheet contains a great many numbers—indicating perhaps more than 1000 "job cards"—that is, jobs which must be

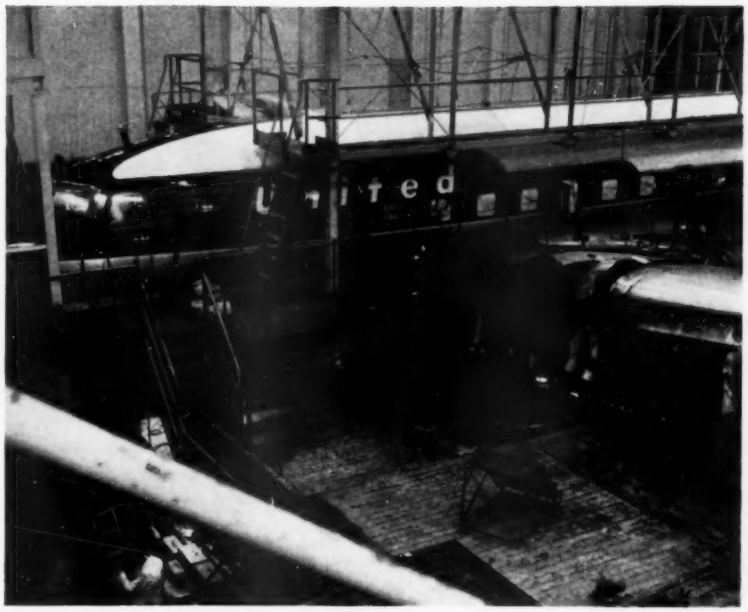


Fig. 2. The maintenance crew, assigned to definite jobs, begin repairs on this airplane. Any one of the 24 overhaul runs may call for as many as 1000 job cards

accomplished during this, the 12th "run" overhaul period. These cards, already pre-printed, are gathered up.

Job cards are proportioned over the five work days—time allotted to each DC-6 for a routine "run" overhaul. The system is completely flexible. While the 1000-plus cards indicate the expected, planned maintenance for a DC-6 during its 12th overhaul, maintenance planners know that 33 to 45 per cent additional, unforeseen jobs will crop up during inspections. Unscheduled work is provided for in the planning.

"Change orders" are another classification of "unscheduled" work—new improvements which United's engineering department orders. "Change orders" come down to Plane Overhaul Planning 10 days before a ship's arrival date. Eventually, change orders are translated into regular job cards, if necessary.

Now, it is 24 hours prior to DC-6 6022's arrival. In Plane Overhaul

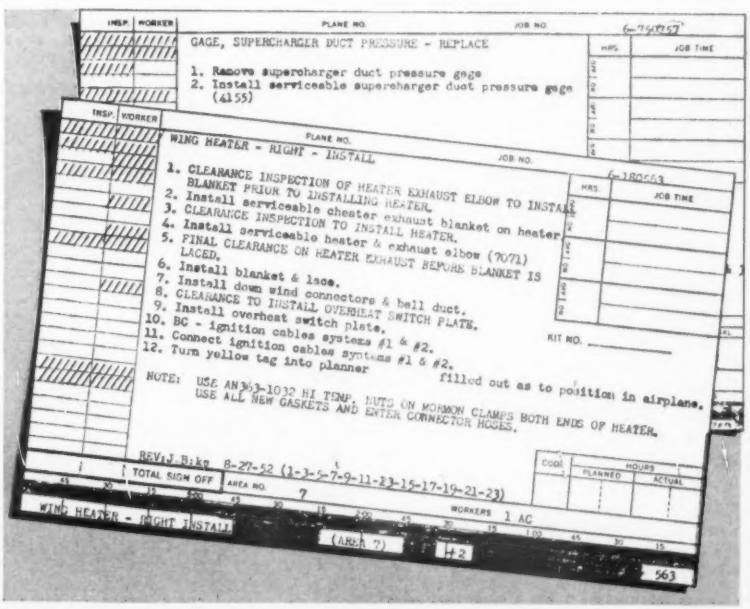

INSP.
WORKER
PLANE NO.
JOB NO.
GAGE, SUPERCHARGER DUCT PRESSURE - REPLACE
1. Remove supercharger duct pressure gage
2. Install serviceable supercharger duct pressure gage (4155)
HRS.
JOB TIME
WING HEATER - RIGHT - INSTALL
1. CLEARANCE INSPECTION OF HEATER EXHAUST ELBOW TO INSTALL BLANKET PRIOR TO INSTALLING HEATER.
2. Install serviceable cheater exhaust blanket on heater.
3. CLEARANCE INSPECTION TO INSTALL HEATER.
4. Install serviceable heater & exhaust elbow (7071)
5. FINAL CLEARANCE ON HEATER EXHAUST BEFORE BLANKET IS LACED.
6. Install blanket & lace.
7. Install down wind connectors & bell duct.
8. CLEARANCE TO INSTALL OVERHEAT SWITCH PLATE.
9. Install overheat switch plate.
10. BC - ignition cables systems #1 & #2.
11. Connect ignition cables systems #1 & #2.
12. Turn yellow tag into planner
KIT NO.
NOTE: USE AN363-1032 HI TEMP. NUTS ON MORMON CLAMPS BOTH ENDS OF HEATER. USE ALL NEW GASKETS AND ENTER CONNECTOR HOSES.
filled out as to position in airplane.
REVISED 8-27-52 (1-3-5-7-9-11-23-15-17-19-21-23)
TOTAL SIGN OFF
AREA NO.
7
WORKERS 1 AC
WING HEATER - RIGHT INSTALL
(AREA 7)
42
563

Fig. 3. Job cards shown above are typical of the many repairs that are required for each of the 24 overhaul periods. Each card covers a specific assignment

Fig. 4. Scheduling boards are "loaded" at least 24 hours before a plane's arrival. A separate board is prepared for each day a plane is scheduled for repairs

Planning, five Remington Rand Sched-U-Graph boards are set up, one board covering a day's work, providing two-shift scheduling each day. The Sched-U-Graphs detail the repairs required and assist in getting the maintenance jobs assigned to mechanics.

The boards are marked off in hours —from left to right—16 hours in all (representing work by two, 8-hour shifts). Transparent plastic pockets run horizontally across the board, one for each mechanic (one on days and one on the swing shift). Each pocket contains the names of the two mechanics, listed under their specialized department: "Engines," "Cockpit Controls," "Cleaning," "Cabin equipment."

Now, the Plane Overhaul Planning Department, with its five scheduling graphs set up, begins to "load" the graphs. By loading, planners mean that each mechanic (or technician) will be assigned a certain number of job cards, according to his specialty, and the estimated time needed.

How Jobs Are Assigned

Let's take John Jones, who is a specialist in the cabin equipment department. Jones works on the day shift. The plastic pocket of the scheduling graph opposite his name will be loaded for the eight hours Jones is at work. Perhaps four cards will be placed in his pocket. When he arrives at work on the first of the five-day DC-6 repair job, he will tear out and replace a heater. A job card describing this work and the estimated time required for it will be placed in the pocket under "8 o'clock."

This first day Jones is assigned four different jobs dealing with cabin equipment, each by a different job card. His total "loaded" time is six hours. The extra two hours are left blank so Jones can be assigned his share of the unforeseen, unscheduled cabin work which will show up following preliminary inspection.

When Jones and the other mechanics arrive at Dock 6, the big DC-6 is already in the dock. The scheduling board, representing this first day's maintenance, is set up at a dock planner's office near the dock.

Jones reports for work and the dock planner finds his name and his first job card for the day. The dock planner tears the card off a stub and the stub is left on the board. The dock planner stamps the card in a time clock, recording "time out" on the job, and hands the card to Jones. The card describes the work Jones has to do. An entire plane maintenance crew can be assigned in less than three minutes by this system.

When Jones completes his first job, he returns the card. The dock planner stamps it, asks Jones to sign his work as "completed," drops the card in the "inspector's box," marks the job card number off his Master Job Card board, and tears off the next job card, leaving the stub in as before. The new card is time-clocked, and Jones is back on his second maintenance job for the day.

Stubs are removed and discarded when inspectors approve the job. Thus, at day's end, when dock planners scan the board, it should be nearly empty—signifying all jobs completed or near completion.

Next day, the second scheduling board is brought out to the dock planner—representing the second maintenance day's work load. And so, the maintenance schedule goes.

Fig. 5. Job card is torn off board while stub remains to keep track of work

Fig. 6. Each job sheet assigned to a crewman is time-clocked at time of issuance, and when the work is completed. At end of day board should be nearly empty

Heating System Plant Engineered From Idea to Installation

Because of the heavy load on the boilers at Ford Motor's Torrence Avenue plant in Chicago, it was necessary to consider another source of heat . . . Here is how the plant engineering department handled the project

By R. G. HODGE, Manager, Plant Engineering Dept., Ford Motor Co.

About the Author

Richard G. Hodge has been Manager of the Plant Engineering Department of the Chicago plant for the last seven years. He has been with the Ford Motor Co. since 1923, and was first employed as a steamfitter in the Highland Park, Michigan, plant.

In 1929, he moved to the River Rouge plant, working as a draftsman in the plant engineering department. In 1933, he came to the Chicago plant, where he was assistant to the general foreman for four years before his promotion to general foreman. He served in this capacity until 1947 when he took over his present duties.

SUPPLEMENTARY HEATING—via a natural gas pipeline—has relieved the load on our four small boilers. Before this equipment was installed, the boilers were pushed hard to keep up the combined requirements for heating the plant and supplying process steam for many operations on the production line.

Because of the heavy load on the boilers, the company seriously considered other means of relieving this condition. After checking several different methods of alleviating the work load, we felt that the answer to our problem would be a supplementary heating system.

With this in mind, we proceeded to consider what heat medium and what types of equipment would best serve our needs. After weighing the advantages of several heating systems, we decided on installing gas-fired units.

It was then necessary for the plant engineering department to prepare the engineering drawings and costs for presentation to management for approval. Les Curnow, our staff design engineer, was placed in charge of this project.

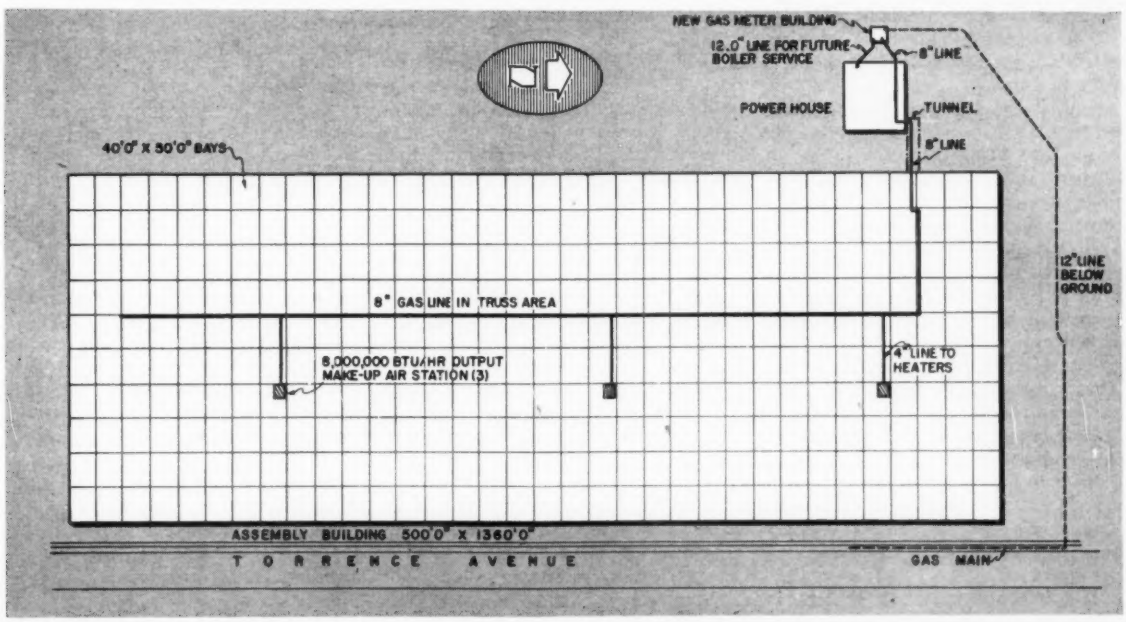
It was his job to request bids from suppliers on the various types of gas-fired units they could supply. He utilized the average cost of the number of units required into an over-all estimate of the complete installation.

In addition to the bids, a gas system layout had to be prepared. This involved a gas house which would have to be erected where our service lines would be connected to the main line.

After all the material was collected from the suppliers and the necessary drawings made by Frank Warot, design draftsman, the plant engineering department prepared an estimate on the cost of the over-all job. This report was then presented to the plant manager, S. L. Simmons, for his approval. He, in turn, sent the information to the home office, in Detroit, for approval of the plant engineering department there and further processing.

After Detroit approved it, requests

Fig. 1. Line drawing illustrates how pipeline leads into gas house and from there to the three heating stations in the plant



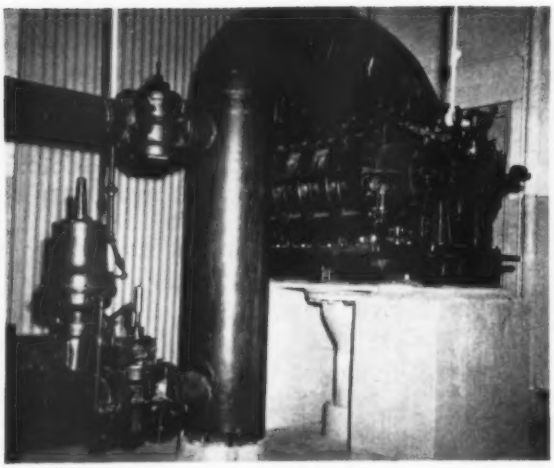


Fig. 2. One of the two metering units in the gas house. The 12 in. line (not shown) is at right of this 8 in. line

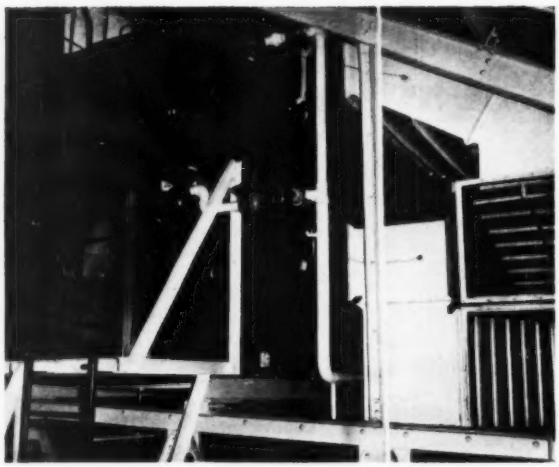


Fig. 3. View of one of the heating stations located in the rafters of the plant. There are three units throughout plant

were then sent out for several bids on piping installation and the construction of the new gas house.

When all the bids were in, they were reviewed by a committee which included the plant manager, the plant engineer and the purchasing agent. The committee, after reviewing and discussing the bids, made their recommendations.

As with the previous bids, the bids for the contracting work were sent to the plant engineering department in Detroit for their consideration. Upon approval in Detroit, the bids were turned over to the purchasing department. It was then up to the purchasing department to prepare the necessary purchase orders for the various jobs.

The next step was in the actual laying of the pipeline, erecting the gas house and installing the three gas heater stations in the plant.

The main gas line, a 12-in. pipe, enters the gas house, where it connects with an 8-in. and 12-in. line. The 8-in. line is supplying gas to the three heater stations in the main assembly area. The 12-in. line, not in use at present, will supply gas to the coal fired boilers during the summer months, after necessary alterations.

Each heater station has four units with inlets opening to one large plenum chamber. See Fig. 3. Each of the four units in the station can handle 25,000 cfm of outside air at a heat output of two million Btu per hour. This is equivalent to eight million Btu per hour per station.

Heat output of the units varies with the outdoor temperatures. A temperature bulb on the outlet side serves to modulate flame size at the burners. With a rise in the outdoor temperature, the gas flow to the burners is cut down.

The inlet duct to the heaters is equipped with motorized dampers which shut off the opening when the heaters are not operating, keeping out blasts of air that would create drafts.

This installation provides heat for about one-third of the plant and has also helped to relieve the steam requirements of the boilers.

AUTHOR'S RESPONSIBILITIES— TYPICAL OF FORD'S PLANT ENGINEERS

1. Responsible for the organization and direction of activities necessary to maintain the plant and its equipment and to provide the services for operating the facilities safely, efficiently and economically.

2. Performs all services of fabrication, alteration, modification, installation and rearrangement or supervises such work when performed by contractors, in accordance with approved drawings and specifications. Cleans, services, maintains, and repairs plant and production equipment, transportation equipment, buildings, plantsite improvements, and utility equipment and distribution systems.

3. Directs the preparation and activation of schedules and instructions for the periodic inspection, service, maintenance and repair of equipment, plant facilities and buildings at the lowest cost consistent with a standard which prevents deterioration, depreciation of value and appearance, and assures uninterrupted production.

4. Responsible for the preparation and current status of accurate scale drawings of plant buildings, plantsite and utility distribution systems; prepares engineering layout and detail drawings, specifications and cost estimates for additions to and modifications of plant buildings, offices, plantsite, and utility equipment and distribution systems.

5. Directs the review of specifications and layouts for processing and finishing equipment and controls the physical arrangement or rearrangement of building interiors with regard to floor loads, distribution of utilities, compliance with fire prevention and safety standards, ventilation, heating, air conditioning, lighting, cost of maintenance, housekeeping, sanitation and sewerage disposal.

6. Provides, distributes and controls the use and application of utilities, such as electricity, water, steam, gas, compressed air, etc.; maintains records of demand, consumption and costs for preparation of monthly and yearly Utility Reports.

7. Responsible for the control and disposal of all industrial wastes, including those causing air and stream pollution problems; collects, segregates and disposes of metal and other scrap and salvable materials.

8. Directs the promotion and enforcement of a high standard of cleanliness, orderliness and neat appearance in offices, manufacturing and storage areas, employee facilities, and plantsite.

Control Methods Help Rid Your Plant of Insects

Infiltration of insect pests into an industrial plant is often the plant engineer's headache . . . Various types of insects, with most effective insecticide for each, are discussed . . . Continuous or intermittent treatment is the best remedy

By H. NYE JOSLEYN

INSECTS IN AND ABOUT the plant are a source of hidden costs that can add up to an appreciable, sometimes astounding total amount of money. Often visible damage can be traced directly to insects but just as frequently, their disastrous effects are not so readily apparent.

In providing safety and comfort to the workers as well as in protecting structures and products, insect eradication normally comes under the supervision of the plant engineer. Efficient control calls for a knowledge of building structures, information on the habits of the more common insect pests, and persistence in modern methods of extermination. For this reason methods of control are rapidly becoming needed tools of the maintenance department.

Cockroaches. Of the fifty-three varieties found in the United States only a few are of primary importance in plants. The habits of the American, Oriental, German, and brown-banded roaches are alike in that they all are particularly attracted to meat and sweetened material of many kinds, and require similar methods for control. Possibly carriers of disease, they also attack food, paper, clothing, books, and leather, injuring or destroying much more than they consume.

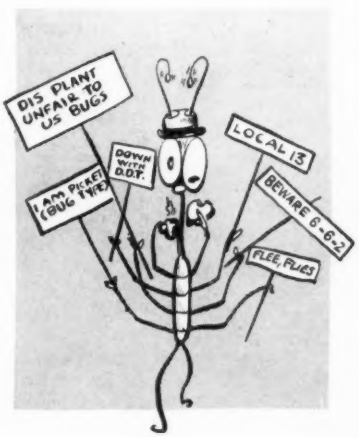
Breeding Habits

The larger brown American and the black Oriental cockroaches take a year to develop from the eggs and mature to a length of from one and one-fourth to two inches. In foraging during the night they wander surprisingly long distances from their breeding places in steam tunnels, boiler rooms, damp basements, sewers, yards, and under excavated buildings. During cold weather they can survive only in heated buildings.

The smaller German and brown-banded cockroaches develop two to three generations a year and are about one-half inch long when full grown.

They live mostly inside buildings and are often found during the day under tables, back of switch boxes, in cabinets, and other similar locations. While the German cockroaches live in or near the place where they are found, the brown-banded roaches wander all over the plant.

Cockroaches are controlled by cleaning for elimination of breeding and hiding places, and by insecticides. Persistence is necessary both because of their relatively slow generative process and because they rapidly seem to develop a sense of persecution that causes them to migrate out of sight into normally unfrequented areas. Visible results do not always follow immediately



although large numbers may have been exterminated.

Satisfactory insecticide control has been obtained with chlordane applied as a two per cent light oil spray or as a five per cent powder. As an alternate a sodium fluoride dust of fifty per cent strength has given good results. A five per cent DDT kerosene solution is recommended but is not as effective as chlordane. In plants where food might be contaminated by chlordane or DDT, pyrethrum sprays and powders are used. Pyrethrum is often referred to on labels as Persian or Dalmatian powder.

Of lesser value, though in common use around food, is a powder easily made by combining 37 ounces of well mixed borax, 9 ounces of powdered starch, and 4 ounces of cocoa.

Flies. The common house fly exacts an appreciable toll in human disease and production efficiency. As a suspected carrier of colds, and many other diseases, it is a major cause in time lost from work. Costs rise due to added operations of screening, sifting, or washing contaminated products.

Flies cannot breed without the filth of decaying vegetable or animal matter. Eradication is by sanitation, insecticides, and various mechanical traps.

Aids to Sanitation

Sanitation control consists of prompt removal of garbage, manure or other material subject to decay in concealed as well as in obvious locations. Hot water and steam are valuable aids in cleaning hard-to-reach crevices or corners.

Because the fly soon builds up an immunity to some insecticides, it is advisable to alternate the types and methods of applications. Applications of DDT may be alternated with compounds of pyrethrum.

An accepted method of preparing DDT solution for flies is to mix one pound of the solution dissolved in two quarts of carbon tetrachloride with three and one-half pints of No. 3 fuel oil. Pyrethrum, the active ingredient of many commercial insecticides, is made into an effective spray by mixing one quart of ten per cent pyrethrum in diobase to one pint of piperonyl butoxide and one pint of No. 3 fuel oil.

These sprays are best applied by liquefied gas or mechanical spray under a recommended pressure of 70 psi in a fine spray of from 5 to 25 microns, dependent upon the size of the enclosure to be treated. Research by the U. S. Bureau of Entomology showed the generally accepted spray size for flying insects to be between 10 and 20 microns mass medium diameter.

Mosquitoes, as a disease carrier and annoying pest, can take a toll of manpower just as surely as other calamities.

Often overlooked is the fact that while these insects breed only in water, great swarms can be produced in extremely small pools. They breed in the small quantities of water contained in old tin cans, poorly drained gutters, watery weed stalks, or in abandoned machine casings. Spraying oil or kerosene into the cavities and onto the weeds is effective in killing the larvae.

Before DDT there was no known effective and economical way to kill large swarms of adult mosquitoes out of doors. For outside grounds an oil solution of five per cent DDT applied at a recommended dosage of two to three quarts per acre is satisfactory in eliminating adult mosquitoes and larvae without injury to small animals or fish. Within enclosures the same DDT solution recommended for flies, sprayed under pressure for a few seconds to each 1000 cu ft of air, will kill all the mosquitoes present.

Repellents for Personnel

Of special interest to night laborers, night watchmen, and others working in infested areas is the highly effective repellent developed by the military services. This promising material consists of dimethyl phthalate, Rutgers 6-12, and indalone. One mixture of these chemicals is commonly known as 6-2-2.

Ants live in and cause damage to walls, partitions, sub-flooring and wooden sills. In moist places the grubs are often found to be constantly at work tearing wooden structures to pieces.

Ants are not always easy to control because of the difficulty in locating their numerous colonies. These are frequently found in or near old pieces of wood in the earth which has been used as fill around new basements. The colony may be exterminated by pouring in a half pint of carbon tetrachloride to each 24 sq in. of ground surface. In buildings, ants are best controlled by a two per cent chlordane spray, or a five per cent powder, deposited in cracks or openings through which the insects travel. Sweetened poison baits, available commercially, are occasionally effective.

Termites do extensive damage to woodwork and other cellulose-type material used in building construction. They may infest plants where they have been previously unknown by being transported in the wood of crates from termite-populous areas.

Termite Control

A basic principle of all termite control is to break the line of contact between the soil and the wood. In doing this foundations should be tight and free from voids, unexcavated buildings should have a proper clearance of eighteen inches above the ground and be well ventilated and drained.

In blocking off buildings from the soil the structural supports are surrounded with trenches one foot deep by fifteen inches wide for buildings having no excavations, with the trench depth increased to two feet for buildings with basements or deep footings.

Applied in trenches, the following insecticides are effectively used in a quantity of about two quarts to the lineal running foot: one part of creosote diluted with two parts of kerosene; a ten per cent solution of sodium arsenite; or a five per cent solution of DDT diluted with No. 3 fuel oil. Good results have been obtained by fumigating with carbon tetrachloride poured into cavities, all available openings being sealed off as soon as the chemical is applied. If a dry powder is desirable, five per cent chlordane or ten per cent DDT may be used.

Crickets sometimes invade boiler rooms and factories in great numbers. Although they occasionally eat holes in fabrics they are not attracted by food. However, they are often considered a nuisance just by their presence. Crickets can be controlled by a two per cent chlordane or five per cent DDT spray, or with dusts containing five per cent chlordane or ten per cent DDT. Apply these insecticides in dark corners and other hiding places. As a poison bait sodium arsenite is recommended.

Chiggers. Many outdoor workers in the central and southeastern states have at sometime become infested with chiggers. Eradication is necessary in some cases to keep men working. While in the United States these insects are not generally known as disease carriers, their vicious and annoying bite, which causes an intense itching, can lead to secondary infection.

Only the larval stage, when the chiggers must have blood for further development, is parasitic on man. Because the larva is a very small mite about the size of a pin point, it is seldom seen.

An almost 100 per cent effective chigger repellent is dimethyl phthalate applied in rings on the trouser cuffs and on the socks near the shoe. A dimethyl phthalate soap emulsion is used by the armed forces as a method of impregnating clothing, and solution of benzyl benzoate used to treat clothing has been found to protect individuals even after two launderings.

In mixing chemicals used for extermination it is well to remember that all of the active ingredients are neccessarily poisons. Only experienced persons wearing protective clothing should be allowed to mix or dispense insecticides. Follow the instructions on the containers carefully, bury left over wastes, and thoroughly clean receptacles after use.

"No stupid, I said the fork truck!"

Electrostatic Disc Sprayer Paints Evenly, Saves Money, Too

In addition to reducing costs in production time and extra labor during clean-up period, present system, with less overspray, reduces fire hazard

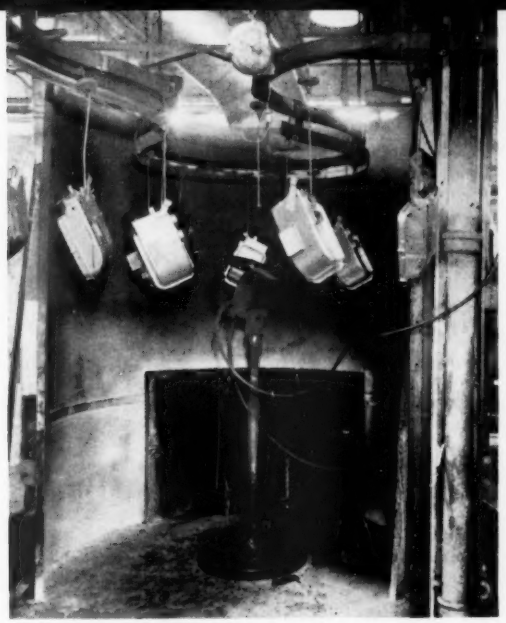


Fig. 1. Automobile parts enter booth, circle past electrostatic disc sprayer to receive coat of paint

IMPORTANT SAVINGS in paint, labor and physical effort, increased operator safety, plus more uniformly processed parts, are major benefits from a new type electrostatic paint spray system recently installed by the Heater Division of the Eaton Mfg. Co., Cleveland.

With the former electrostatic equipment, at least one hour was required to clean the painting area. On Saturdays, the entire booth had to be stripped down and cleaned and additional men were required to clean the exhaust stacks. Another costly aspect of the former system: overspray was partially picked up by a filter system; filters had to be replaced each night, costing the Division nearly $3000 per year for filters alone.

This new equipment consists of a voltage pack connected to a paint sprayer, creating an electrostatic field between it and the moving parts. The conveyor itself acts as a ground for the system; the positive pole is the tip of the disc on the sprayer; and the individual parts, components for automobile heaters, act as the negative field.

Electrostatic Field Does Trick

The paint sprayer used is of the floor disc type. A pump unit supplies paint through a hose to the disc where rapid rotation feeds the paint at a uniform rate to its outer edge.

Atomization occurs under the influence of the electrostatic field, producing a spray pattern of electrically charged particles. The irresistible attraction of the field pulls the spray to the moving pieces, where practically all of the spray is deposited. Conventional type spray booths are not used since there is no appreciable amount of overspray paint to be exhausted.

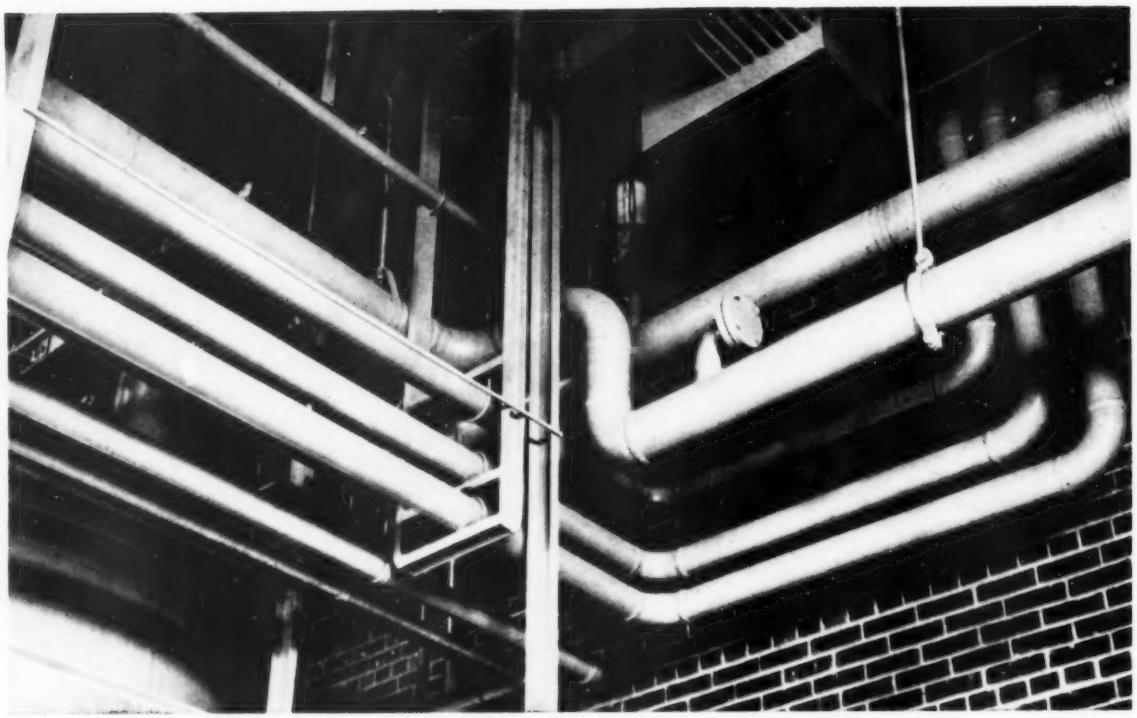
The painting area is located adjacent to the route of an extensive overhead chain conveyor system which is used for inter-departmental transportation of the heater components. As the main carrier passes the painting department, operators remove parts from the conveyor hooks and place them on the secondary conveyor which feeds the spraying equipment. As the parts emerge, they are again returned to the main conveyor.

With previous paint spray equipment, the amount of paint used could not be correspondingly correlated to a low conveyor speed. Thus, it was necessary to run the secondary conveyor at twice the speed of the inter-departmental carrier and shut off painting 50 per cent of the time. If this had not been done, the pieces painted in relation to the amount of paint used would have decreased sharply and increased maintenance and housekeeping activities would have been necessary. As a result of spraying only half the time, some parts had to be temporarily stored on the floor.

Under the present system, both conveyors are synchronized since spray output can now be regulated even at slow speeds. Not only is less paint used, but excess pieces need not be stocked awaiting space on the main conveyor. Thus, pieces are handled only once instead of twice, and labor and handling costs are greatly reduced.

Because of the almost negligible amount of overspray generated, a serious fire hazard resulting from excessive waste collection on the floor, in booth and stacks has been eliminated.

Fig. 2. Parts are being transferred from inter-departmental conveyor to secondary conveyor which feeds the paint booth. Worker at right operates control board



WELDED PIPING SYSTEMS— Fabrication and Maintenance

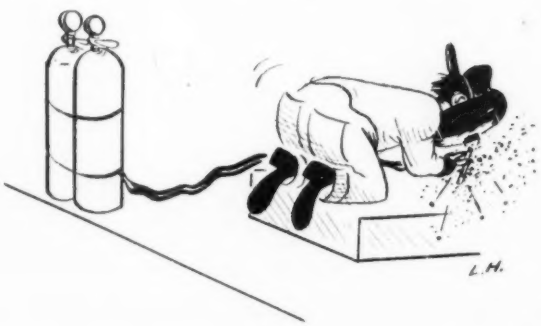
Welding processes . . . Characteristics of butt joints, and socket or lap joint with fillet weld . . . Use of backing rings . . . Correct welding procedures . . . Advantages of welding

By JAY S. CASE, Plant and Production Engineer, Tube Turns

THIS ARTICLE WILL deal exclusively with the fabrication and methods of maintaining welded piping systems, which generally consist of pipe, valves and fittings of carbon steel. There are many other special service piping systems that utilize the low, medium and highly-alloyed steels and the entire range of non-ferrous piping materials.

The manual metallic arc, or oxy-acetylene processes are usually used to weld carbon steel employing suitable filler metals and welding techniques. Weldability, as a term, has as yet no exact definition but is accepted to indicate either the relative ease or difficulty with which materials can be welded. Compositions of carbon steel and wrought iron, conforming to those given in Table I, are the most weldable of piping materials in that they require a minimum of precaution in welding them to assure sound welds, free from cracks and porosity. Further, their utility is not affected in that they are not subject to major changes in chemistry, physical properties or metallurgical structure due to welding.

Basic principle and advantage of welding a piping system is to fabricate a system which is in effect one piece of metal. Most systems employ the use of mechanical joints, locating them at points where it may be desirable to disconnect the system for any reason.



Since welding requires that the pipe, or fitting, ends be melted, it follows that sufficient heat from some source, intense enough to attain the melting temperature, be applied with additional molten metal, introduced in small quantities, to the joint. The control of this heat must be such that it can be localized within the desired area, and so that overheating of the molten metal can be avoided.

A number of welding processes have been developed around the fact that there are several fundamentally different sources of heat, and a variety of methods of application. Among the several available types of heat are the electric arc (arc welding), the resistance to the passage of electric current at the juncture between two pieces of metal (resistance welding), the chemical action between iron oxide and aluminum (Thermit welding), and the burning of a fuel gas with oxygen (oxyacetylene welding).

Each of these sources of heat is intense enough to bring small areas of a piece of metal to the melting temperature without raising the temperature of the rest of the metal appreciably. Therefore, all are practical for welding. The methods of applying this heat are widely varied in that some of them are best suited for pipe welding in general, while others are useful only under special circumstances or with particular metals.

Most generally used electric welding process in the piping field is the shielded metal arc process wherein an arc is maintained between an electrode and the workpiece. Extensive acceptance of this process for pipe welding is due to the uniformly high quality of welds produced as well as to the ready availability of skilled operators, dependable equipment and the ease of application.

Types of Joints

The oxyacetylene process for pipe welding owes its popularity to portability of equipment, flexibility of application, and ease of controlling the amount of heat when welding small light walled pipe.

Two designs of welded line joints are commonly used for either manual arc or oxyacetylene strength welds in piping, specifically, the butt joint and the socket or lap joint with fillet weld.

Butt Joints—This weld joint design should cover the following important features: (a) Develop the full strength of the pipe; (b) Provide sufficient clearance and space for the manipulation of the electrode or rod during welding; (c) Be conveniently made by flame-cutting or machining; (d) Require minimum amount of deposited weld metal; (e) Have a root shape that can be welded with or without backing rings.

The standard form of butt joint preparation shown in Fig. 1 is basic for this type of joint and can be used for any service and any size, or thickness, of pipe materials. Applicable

regulations or specifications determine whether it may be used with or without backing rings. Figure 2 graphically illustrates welding conditions that should be avoided, in comparison with a correct weld.

Backing rings were specifically designed for the primary function of providing a surface upon which to build the weld metal, thereby obtaining complete fusion at the root of the groove and preventing icicles and weld spatter from entering into the pipe. This latter condition is objectionable in all pipe joints ahead of units such as valves, turbines, heat exchangers, etc.

Groove-type welding ring with knock-off spacer pins, as manufactured by my company, offers the ability to secure exact root gap spacing and

Fig. 1. The details of preparing butt joints for welding

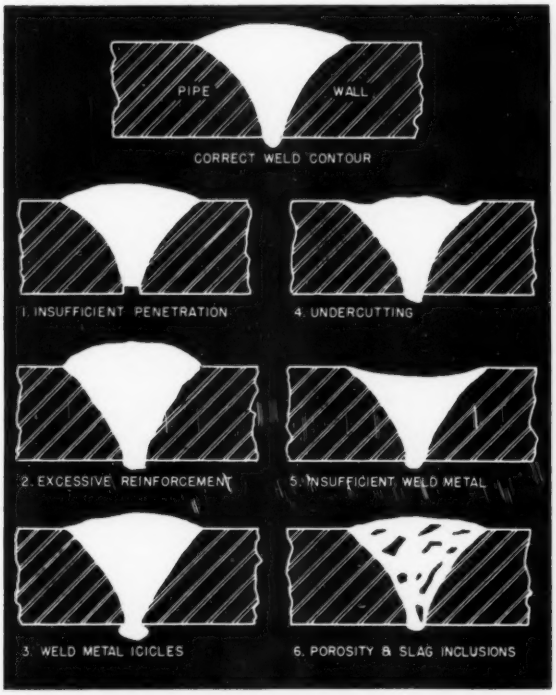
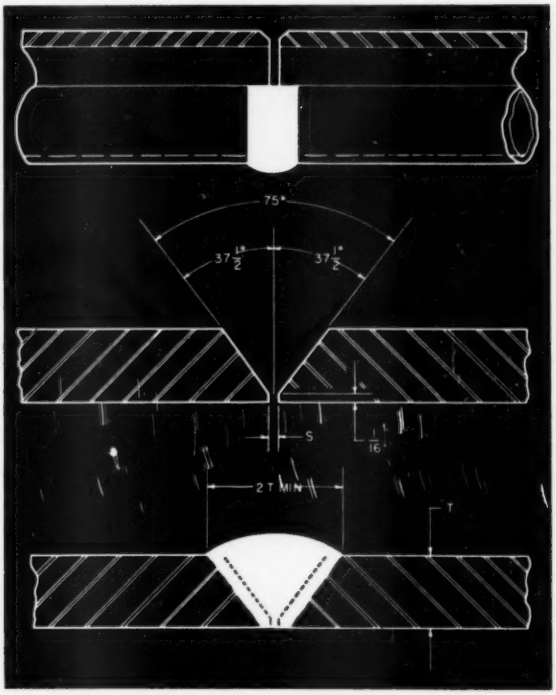


Fig. 2. To obtain a perfect weld watch these conditions



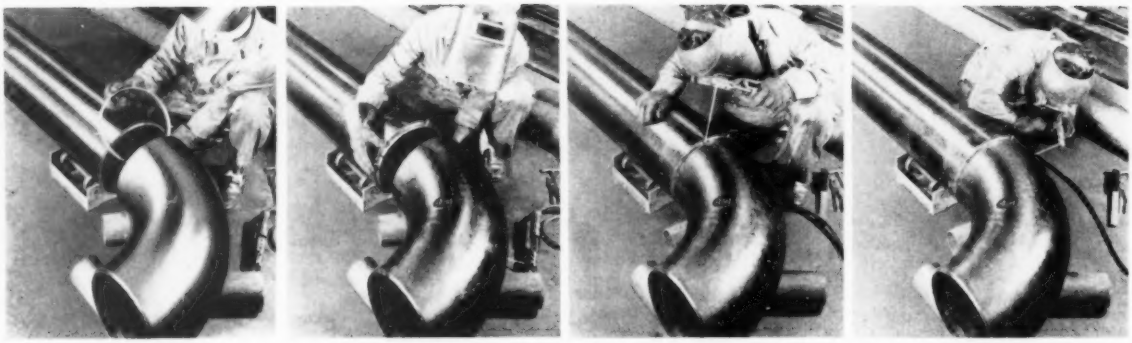


Fig. 3. Observe rules when making up welded piping. 1. After selecting proper welding ring, insert into pipe. 2. Insertion is made easier by grasping two pins near the gap in order to compress ring. Ring is located so that gap is in the most convenient position to make final tack. 3. First tack weld is made between first two pins to one side of ring gap. To keep ring closely against pipe's i.d. each successive tack is made between the next two pins. 4. Second tack is made at next adjacent between-pins location. The third tack will be made at next such location, underneath the pipe **(Cont. on facing page)**

complete penetration. These rings, due to their design, provide the correct root gap spacing during the tacking operation and, also, take into account the reduction of the gap caused by shrinkage during the laying of the first pass. Further, the length of the spacer pin is such that the commercial variations in pipe diameters cannot affect their ability to establish and maintain the correct root gap.

The recommended procedure for using welding rings is as illustrated, step-by-step, in Fig. 3.

When arc welding is employed, the arc should be directed initially at the beveled surface of the pipe or fitting and slightly above the root face, or land. When the fusion has begun, sweep the arc smoothly across to the same point on the opposite end of the pipe and dwell there until adequate weld fusion has occurred. Whenever possible, a weaving technique should be used and the first pass should be completed in this manner.

Closing Up the Joint

When gas welding is employed, it is necessary to use a root pass to close up the joint. This can be accomplished with one or more passes, dependent upon the type and thickness of materials used. As in the case of arc welding, the flame should dwell only on the pipe end just above the land and should be swept across the root gap to avoid heat concentration on the exposed portion of the ring.

The specific advantages of using the welding rings mentioned previously are as follows: They assure maximum ductility of the root bead and eliminate the necessity of tacking the rings to the pipe idee. The spacer pins are knocked off after tacking. They aid in the insertion of the rings into the pipe and fitting assemblies as the two spacer pins adjacent to the gap can be grasped as levers to compress the ring for easy insertion. Welding rings aid in the alignment of piping assemblies and minimize the flow resistance due to the venturi shape of the inside surface

Table I. Permissible raw materials used in butt welding fittings and the correct marking of these particular fittings

Steel Composition	Grade[a]	Permissible Raw Materials[b]			
		Pipe	Plate	Forgings	Bar[c]
Carbon steel, grade A	WPA	A 106, grade A	A 285, grade B and C	A 105, grade I	A 107, grades 1008, 1010, 1015, 1016, 1020, 1022
Carbon steel, grade B	WPB	A 106, grade B	A 212, grades A and B	A 105, grade II	A 107, grades 1025 and 1030
Carbon-molybdenum steel	WPI	A 335, grade PI	A 204, grade B	A 182, grade FI	
1 per cent chromium-molybdenum steel	WPI2	A 335, grade PI2	A 301, grade B	A 182, grade Fi2	
1¼ per cent chromium-molybdenum steel	WPII	A 335, grade PII	d	A 182, grade FII	
2¼ per cent chromium-molybdenum steel	WP22	A 335, grade P22	d	A 182, grade F22	
5 per cent chromium-molybdenum steel	WP5	A 335, grade P5	A 357	A 182, grade F5	

a When fittings are of welded construction, the symbols shown above shall be supplemented by the letter "W"
b These designations refer to the following specifications of the American Society for Testing Materials:
A 105—46,[2] Forged or Rolled Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service,
A 106—52 T,[4] Seamless Carbon-Steel Pipe for High-Temperature Service,
A 107—52 T,[4] Hot-Rolled Carbon-Steel Bars,
A 182—52 T,[5] Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service,
A 204—52 T,[4] Molybdenum-Steel Plates for Boilers and Other Pressure Vessels,
A 212—52 T,[4] High Tensile Strength Carbon-Silicon Steel Plates for Boilers and Other Pressure Vessels,
A 285—52 T,[4] Low and Intermediate Tensile Strength Carbon-Steel Plates of Flange and Firebox Qualities,
A 301—52 T,[4] Chromium-Molybdenum Steel Plates for Boilers and Other Pressure Vessels,
A 335—52 T,[5] Seamless Ferritic Alloy Steel Pipe for High Temperature Service, and
A 357,[4] 5 Per Cent Chromium, 0.5 Per Cent Molybdenum Steel Plates for Boilers and Other Pressure Vessels.
c Bar stock to Specifications A 107 shall be open-hearth quality and used only for fittings 2 in. and smaller.
d No ASTM specification has as yet been written for plate of this chemical composition. However, fittings may be made from plate which conforms in its mechanical and chemical properties to the pipe or forging specifications shown for this grade.
A.S.T.M.—A234—52AT—Revised February and October, 1952.

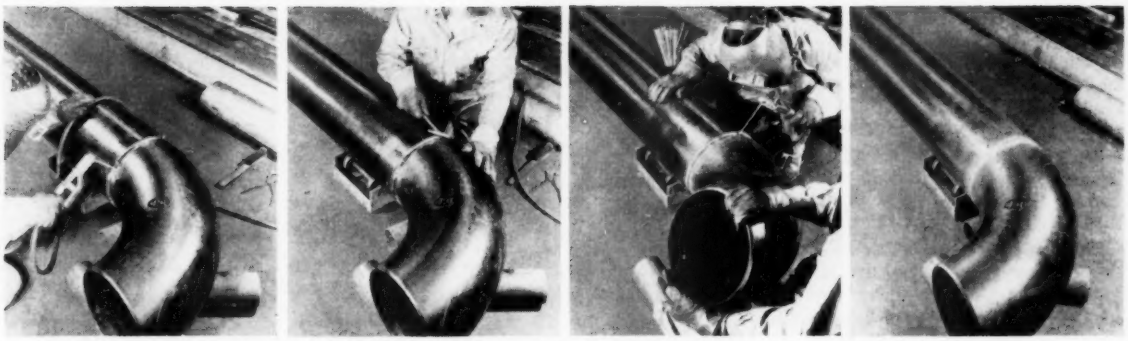


Fig. 3. Continued. 5. Final tack weld should always be made at the gap. Convenient position of gap near horizontal center line of the pipe helps welder prevent icicle formation. 6. Tacking completed, spacer pins are knocked off with one or two sharp blows of welder's chipper, parallel to the ring. Occasionally, pliers will be helpful in lifting pin out. 7. With spacer pins out of the way, the welder lays initial bead under perfect conditions in a clear fixed space at the joint. 8. The finished job forms a solid, uninterrupted piece of metal with the pipe and fitting. The joint is often stronger than the pipe

of the ring. Since these rings are equally suitable for arc or gas welding, they are advantageously used in all types of piping from ordinary low pressure boiler code piping.

Many service piping systems in the low pressure groups and for general plant utilities are fabricated without the use of backing rings. The oxyacetylene welding process is sometimes preferred for 2 in. pipe sizes and smaller because of the reduced wall thickness and less danger of icicles forming on the inside of the pipe. Pipe welding by this process encourages the use of single pass welding. This is particularly true in the low pressure piping field. High pressures require inspection and testing so that in general multipass welding must be used. The logic of this is that if the layer of deposited metal is limited to ⅛ in., the subsequent pass refines the grain structure of the deposited metal. Manual arc welding is used almost exclusively on code or inspected piping work.

Flexible Process

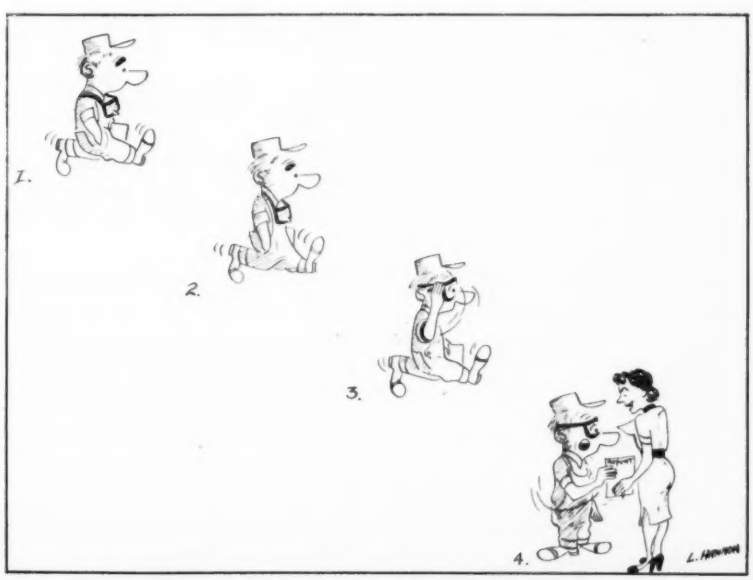
Metal arc welding will fulfill the requirements for a flexible process to complete the wall thickness and size range coverage when welding rings are not used. It is important to point out that one fundamental type of electrode is currently used. This is the shielded arc, or heavily coated electrode. The bulk of all metal arc welding electrodes used today is of this type. The stabilization of the arc and the creation of a gas and/or slag for protection of the molten metal from oxidation is the purpose of the coating which is applied to the core wire.

Advantages of welding in plant utilities and pipe lines are numerous and we will summarize the most important ones. Welded construction offers the greatest economy of weight and space. Further, the various welding fittings offer a minimum of frictional resistance to the flow of fluids and their designs provide smooth interior surfaces, eliminate pockets, offer less turbulence and better flow patterns than mechanical type joints.

Why Welded Piping?

Welded piping design permits the convenience of locating control and regulating valves at any point in the system without restriction to dimensional limitation imposed by flanged or screw type construction. Maintenance repairs to welded piping systems enjoy a distinct advantage as tightness and strength are prime features and low cost maintenance a principal factor. Repairs to welded lines are simply accomplished because the defective part or area can be localized and repaired, altered or cut out and replaced with new materials.

Conformity that is inherent in the welding fittings available today makes the practice of bench type piping assembly completely practical and there has been a definite increase in this method of construction in recent years. The cutting, welding and locating of fittings, valves and flanges are more readily controlled and the handling of the pipe sections is simplified. The ability to rotate or position the various components for ease of welding cuts actual welding time and costs and assures good welds. The sub-assemblies can be cleaned and excess flash or icicles can be ground off, providing a clean pipe interior. Such sub-assemblies can be lifted or secured in place and field or connecting welds can be made at predetermined locations.



"Thank you, Shorty . . . My, you look cute in goggles!"

HOSE DUSTING
No Problem at Goodrich

Uncured rubber hose must be dusted for handling . . . The dust becomes a problem . . . Collectors clean the air, return the dust for reuse

By GEORGE H. SMITH, Engineering Dept., B. F. Goodrich Co.

IN THE PRODUCTION of rubber hose with an OD less than 2 in., the outside cover is applied by running the hose body through a cross head on a tuber, and extruding the cover tight around the body. The rubber at this stage is hot, tacky, and very tender. It is easily torn or marked, and cannot be coiled upon itself or handled without damaging it.

At B. F. Goodrich, the hose is covered on an upper floor and sent through a series of tubes to a lower floor for curing, or if necessary, for coiling until cure space is available.

To facilitate this handling phase with minimum damage, the hose is coated with finely-ground soapstone, mica, or zinc stearate, depending on the curing method to be employed. Upon leaving the tuber, the hose is carried on a short belt conveyor to one of a series of dust boxes, which are arranged so that the hose may be directed into the box containing the proper dust. In each box, a smooth pulley carries the hose through the dust, and in so doing, also serves to keep the dust in motion. These dusts tend to bridge if not agitated continuously, and any undusted area of hose can cause a defect, by sticking later in the process.

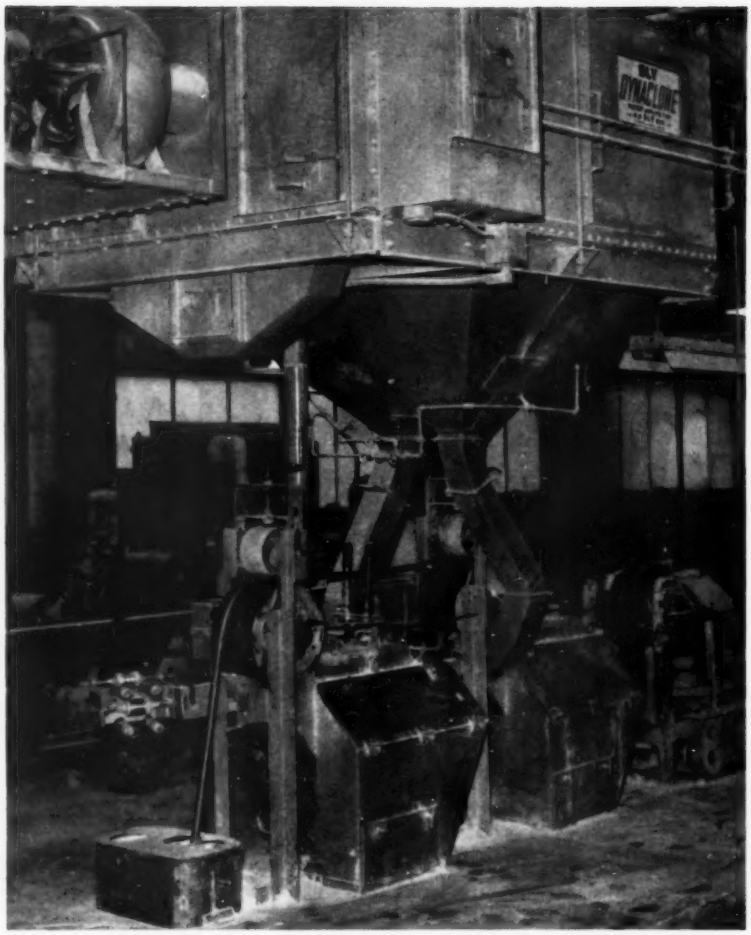
Dust Control a Problem

However, dusting the hose to protect the cover and ease handling produces another problem: 40,000 ft of hose passing through each dust box per day, at speeds of 100 to 160 fpm, would carry much excess dust with it. There would be a constant dust cloud over and around the machines and another in the curing room from excess dust carried down the delivery tubes. Since the dusts used are in the range of 20 to 30 microns (0.000985 in.) they tend to settle very slowly, and the slightest air turbulence carries them for long distances. Pipes, beams, machines and workers would soon be covered with a thick layer of dust.

To obviate this condition, B. F. Goodrich has installed a bag-type dust collector over each dust box. One fan is provided for two collectors, and a transfer valve in the ductwork permits selection of a particular collector.

When the system is in operation, the dust box is held under negative pressure to prevent drift from the dust agitation floating out into the room. At the exit opening of the dust box, a hollow collar is formed around the hose, and tied into the suction side of the dust collector. The openings on the inside of this collar have an entrance velocity of 8,000 fpm. As the hose passes through the exhaust collar, this high velocity air sweeps the hose clean of all excess dust. A velocity of 4,000 fpm in the suction ducts is adequate to carry the dust to the collector and prevent any settling in the ducts. Each collector handles 426 cfm.

The dust is collected continuously, and returned to the boxes for reuse. In one instance, a Sly Dynaclone, which constantly cleans itself while in operation, is installed. This continuous cleaning, a design feature of the Dynaclone, has the effect of maintaining a constant static pressure in the system, which in turn assures a constant velocity at the cleaning nozzles, and a uniform job. If, then, a rotary valve is installed in the collector discharge, a constant cycle is established which requires no attention from the operator except to recharge the system with "make-up" dust. This is necessary only at long intervals, because the dust collector offers storage space for a large amount of dust.



Rubber hose, moving from r. to l., is dusted in one dust box, bypasses the second

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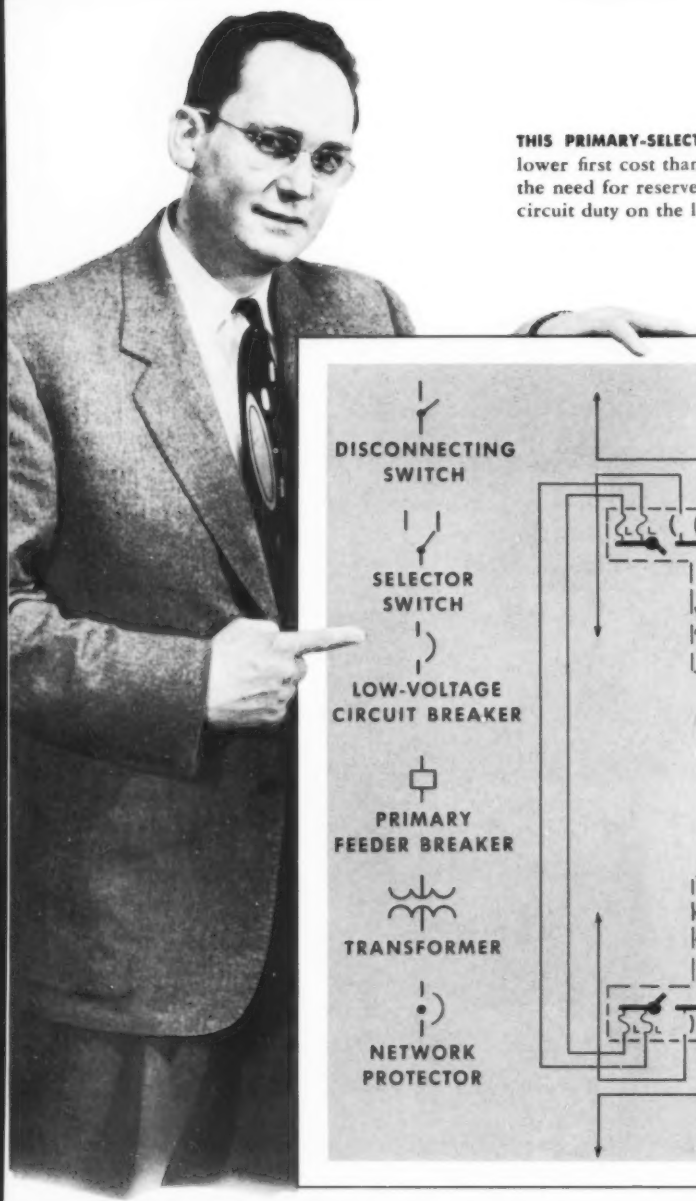
2. Standardizing high voltage control
3. Getting power to the load quickly

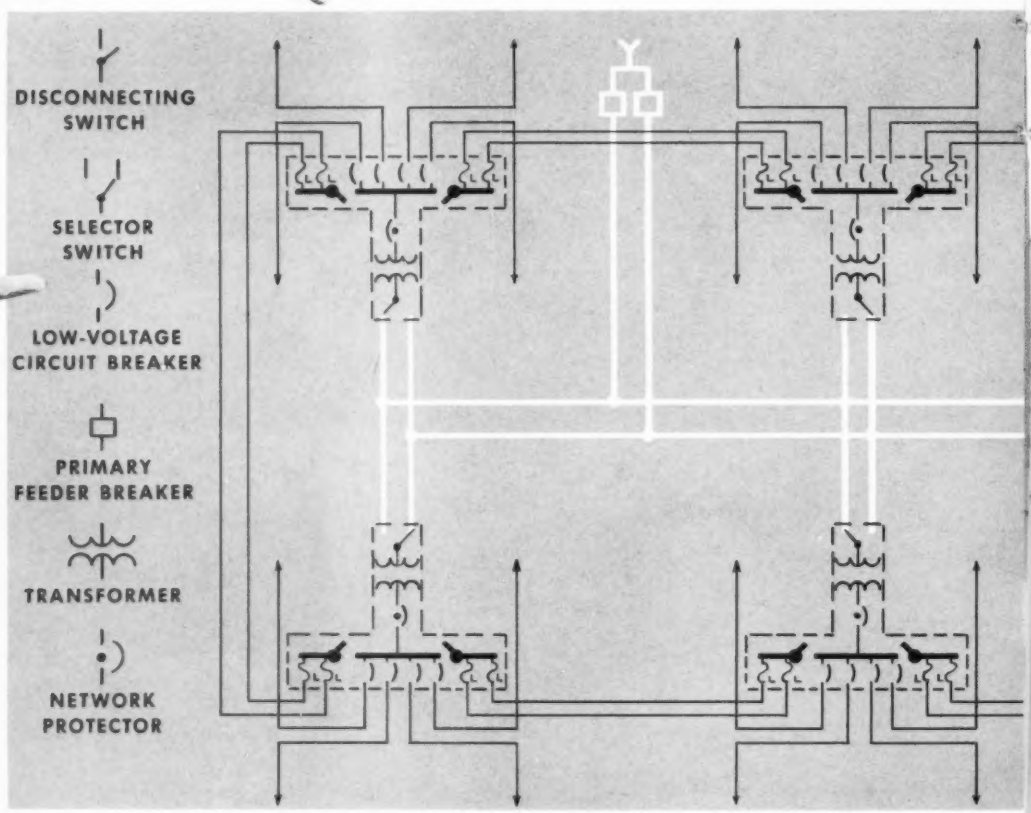
Meet Joe Harris, Westinghouse Industry Engineering Manager, who presents some ideas on improving electrical system flexibility.

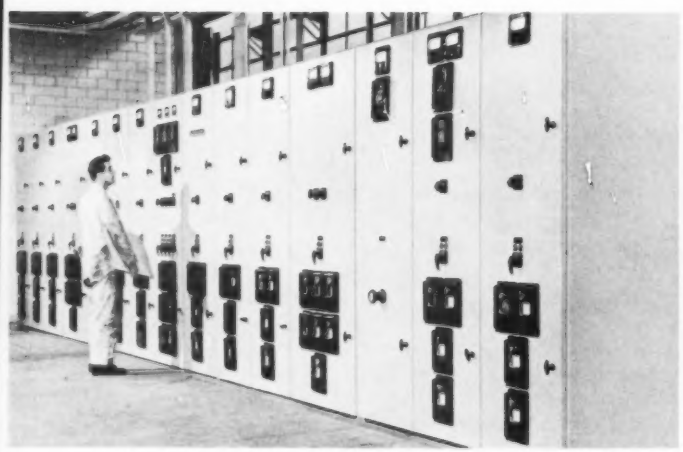
When you plan electrically for plant expansion or improvement, take advantage of Joe's wide experience in solving power distribution problems. It's part of the broad service your local Westinghouse representative offers in the talents of many design, engineering, and service specialists on the Westinghouse team.

Next page, flexibility starts with engineered distribution . . .

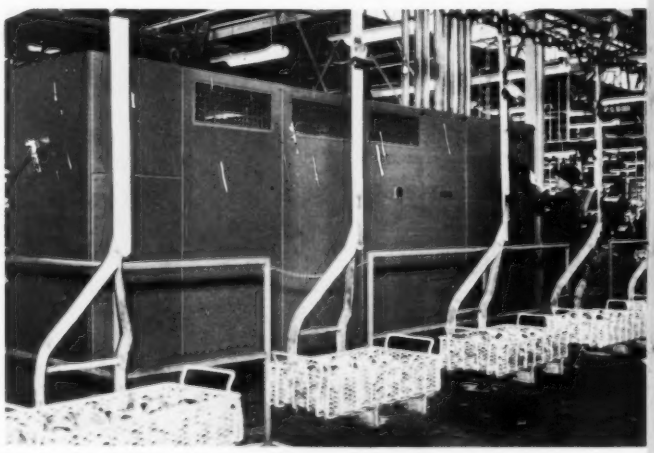


THIS PRIMARY-SELECTIVE NETWORK SYSTEM has the advantage of lower first cost than other types of networks because it reduces the need for reserve transformer capacity and reduces the short-circuit duty on the load circuit breakers.



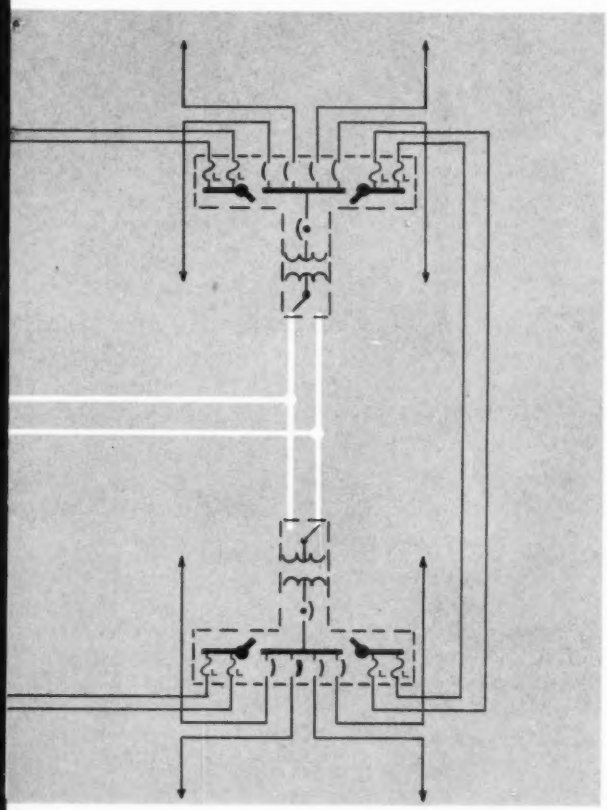


SWITCHGEAR IS EXPANDABLE in standard Westinghouse units. Standardized switchgear can be rearranged or relocated more easily to meet changes in future conditions. It also helps to speed maintenance and inspection.



HIGH VOLTAGE CLOSE TO THE LOAD is a cost-saving advantage you can achieve with Westinghouse power centers. They eliminate long, heavy secondary lines; save substantially on copper; lower line losses and improve voltage regulation.

Networks . . . one answer to flexibility, long-range planning

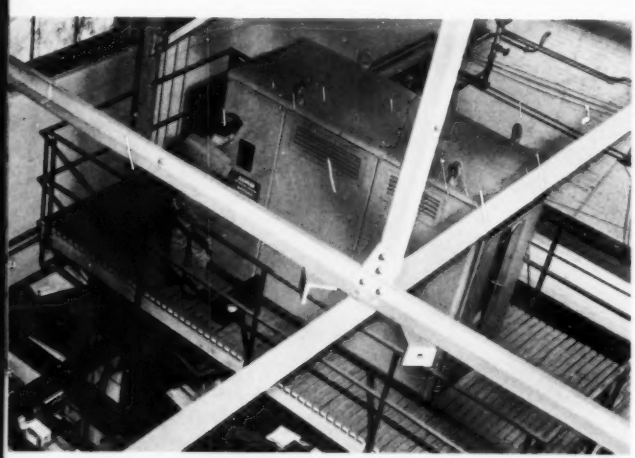


There are many excellent ways of distributing power in industrial plants. But if flexibility is your major requirement, you'll undoubtedly consider a network-type system. The slightly greater cost of a network system buys many immediate and long-term advantages. Network systems are easier to expand to handle increased power demands. Also this type of system is easily adapted to changing production needs which, in the long run, means economy.

Flexibility with this primary selective network system, for example, arises from the use of duplicate primary feeders—each capable of supplying the entire plant load. The feeder arrangement and the secondary-tie circuits permit the loads to divide among the power center, so that optimum voltage conditions are provided.

The ability to isolate any section of the system without disrupting service has obvious advantages. This permits maximum freedom in scheduling electrical maintenance or expansion, without disturbing operation of the plant. The network arrangement enables you to extend the system in any direction—at any time—with minimum rewiring and production loss.

Through the coordinating ability of your Westinghouse representative, you can take advantage of the wide experience that Westinghouse offers in engineering flexible power distribution. Coordinating equipment planning, manufacture, shipment, installation and servicing are all a part of the power distribution job handled by your Westinghouse representative. Call on him for help at any time.



SPACE CONSERVATION is another advantage of Westinghouse dry-type power centers. You can install these compact lightweight Westinghouse units up out of the way of the working area—on balconies or roofs.

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Standardized switchgear adds flexibility this way . . . ⟶

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For high voltage, one man can easily and quickly drawout this DH De-ion air circuit breaker for inspection or replacement. Since breakers of the same rating are physically interchangeable, new units fit without alignment troubles.

Convenient expansion or relocation with standardized metal-enclosed switchgear

To achieve truly flexible power distribution you need equipment that is as flexible as the system itself. Nowhere is this more vital than in switchgear equipment . . . the heart of your plant's electrical control.

Westinghouse switchgear achieves flexibility through standardized frame design and manufacturing techniques. Here's what this standardization means to you:

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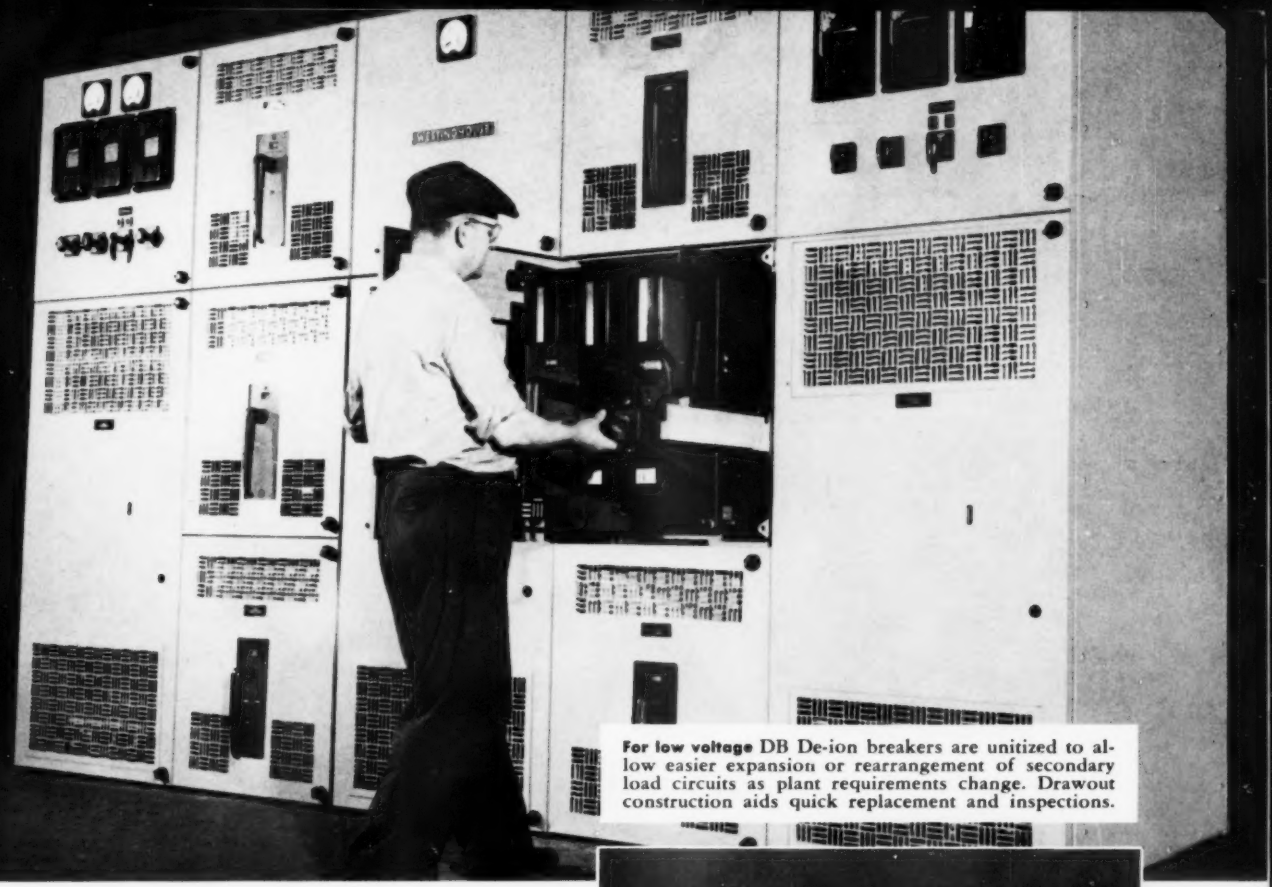
More flexibility per dollar is possible with Westinghouse high voltage metal-clad switchgear because all your money goes into equipment. Special engineering is held to a minimum in standard components that can be assembled in any combination required.

YOU CAN BE SURE...IF IT'S



For low voltage DB De-ion breakers are unitized to allow easier expansion or rearrangement of secondary load circuits as plant requirements change. Drawout construction aids quick replacement and inspections.

switchgear. Expansion in plant facilities is met by simply adding the required switchgear units. Production changes affecting switchgear are accommodated by substitution and rearrangement of units. And since all electrical equipment and connections are completely self-contained, entire installations can be picked up and reinstalled in another location or in another plant.

High voltage versatility Jig assembly of the breaker and stationary structure of high voltage metal-clad switchgear allows rearrangement of breaker units within the same structure. And since breakers of the same rating are interchangeable, conversion to a higher interrupting capacity can be accomplished with minimum expense.

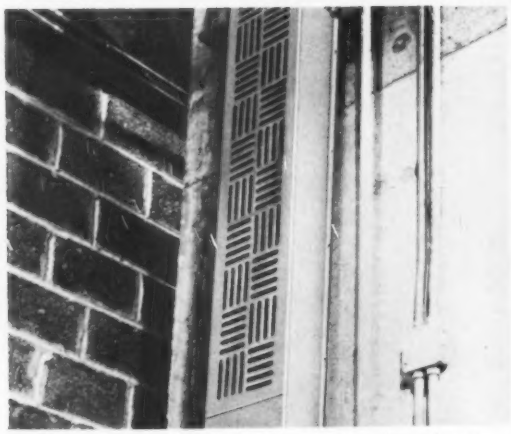
Low voltage service continuity Standardization means less production down time, too. Drawout, DB De-ion® breakers can be changed in three minutes flat. A spare breaker of the same rating can be substituted, and service continuity restored in short order.

Multi-purpose tripping provided only by Westinghouse low voltage DB De-ion air circuit breakers. Breakers allow delayed tripping on temporary overloads; trip on larger overloads before damage is done and trip instantly on short circuits.

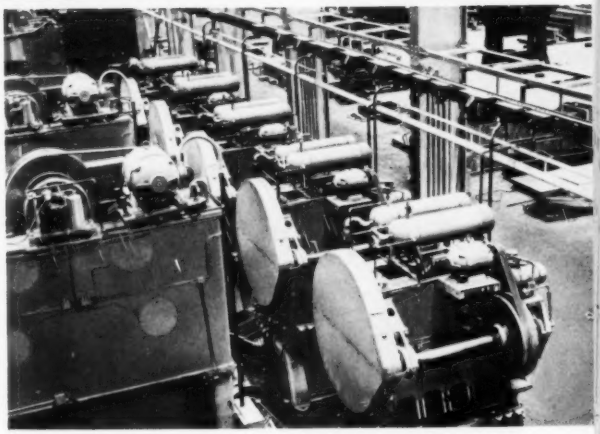
Next page, flexible equipment gets power to the load quickly . . . →

Westinghouse

From switchgear . . . Power is fed directly to the plug-in duct mounted in convenient location. With drop rods in position, duct goes up in a hurry, slide cantilever hangers to position and tighten.



To branch runs . . . This 2000 ampere, low-impedance riser carries power to the upper floors. Note the use of spring suspension hangers which compensate for expansion of duct . . . allow simple installation.



To machines . . . Six power take-offs in six feet of Westinghouse bus duct spell power flexibility for any plant. Plug-in receptacles are provided for circuit breakers, safety switches, and cover-operated fusible units.

Bus duct meets changing load requirements easily

Where system flexibility really pays off is in getting power from switchgear to your production equipment. For this reason alone, bus duct is one of the best investments you can make in secondary distribution.

Unequaled flexibility—Power can be taken off plug-in duct at one-foot intervals for maximum convenience. Plants can be retooled, buildings revamped without rewiring because bus duct can be readily relocated and installed easily, around obstructions, in any layout.

Costs less to install—Prefabricated in sections, bus duct goes in faster than cable and conduit. Savings in installation frequently reduce the original cost below that of any other secondary power distribution equipment.

Power for future loads—Bus duct spells future savings when building alterations and improvements add to power load. It provides important reserve capacity, and what's more, is readily salvageable, dismantled, reassembled, and expanded.

More power per dollar—Up to 5000 amperes, bus duct has greater current-carrying capacity, pound for pound, than any system of wireway or cable and conduit. There are four Westinghouse types: plug-in duct with service outlets for branch runs; low-impedance duct with low voltage drop for long feeder runs; weather-proof duct for outdoor installations that is available in feeder duct; and weatherproof duct in low-impedance duct.

YOU CAN BE **SURE**...IF IT'S

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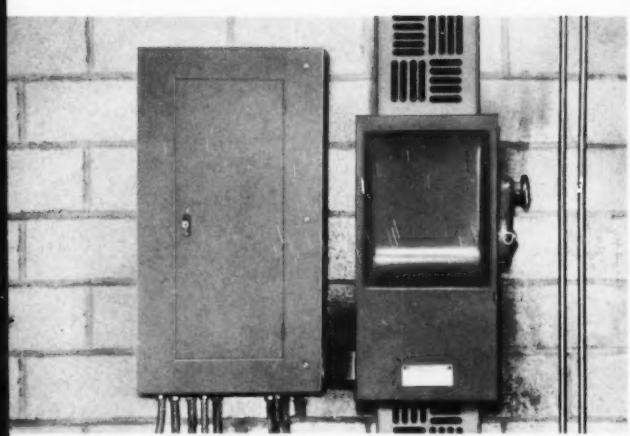

To panelboards . . . Power is taken from plug-in duct. Additional circuits can be added with ease to Westinghouse Add-a-Circuit Panel, simply plug in the contact and wire up the terminals.

Control center expansion . . . Westinghouse control centers save frequently as much as 40% in installation costs over decentralized methods of mounting motor control. Saves time in inspecting control and reduces servicing problems.

Next page, how Westinghouse field engineering serves you . . . ⟶

Westinghouse field service adds a working partner to your team . . .

Westinghouse field engineers are trained to know product and industry problems. When you call on their application know-how, they become a working partner to your engineering and manufacturing personnel, consulting engineers and contractors. It removes your engineering staff from detailed planning.

Simplifies ordering problems . . . Westinghouse coordinates all manufacturing and shipping schedules to deliver matched equipment to the job at the right time. Fast delivery of genuine Westinghouse renewal parts from stock in 31 locations enables you to reduce parts inventories at your plant.

. . . and helps maintain power system flexibility

Thirty-eight large, well-equipped Manufacturing and Repair Plants are available to you for maintenance jobs on all types of electrical apparatus. These apparatus repair plants are spotted in key industrial areas to provide factory-type repairs at a local level.

* * * *

For further information on the products or services discussed in this section or for a copy of the literature listed here, call your local Westinghouse representative, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

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. . . and ask for a showing of the 20-minute film "Selecting The Right Industrial Distribution System".

56 Field Engineering Service Offices help speed completion of power system engineering, installation or modernization. Skilled Westinghouse engineers work with your personnel to coordinate product application.

Field Service Engineers are always ready to make quick inspections, adjustments and on-the-spot repairs for equipment that cannot be moved easily to one of thirty-eight Westinghouse Manufacturing and Repair Plants. MP-3014

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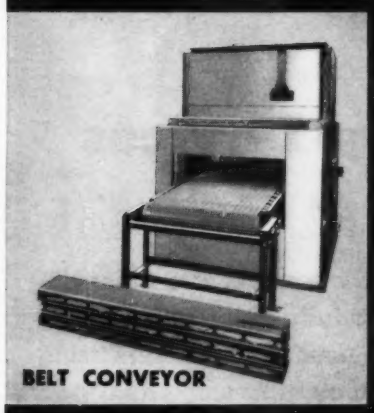
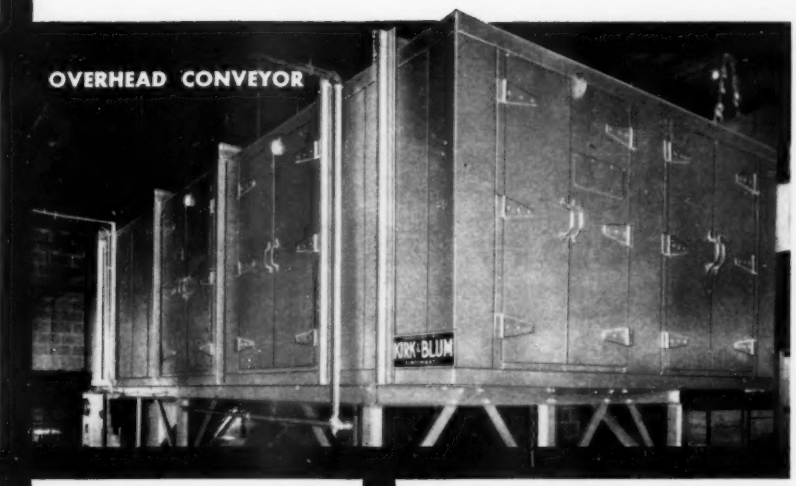


BELT CONVEYOR



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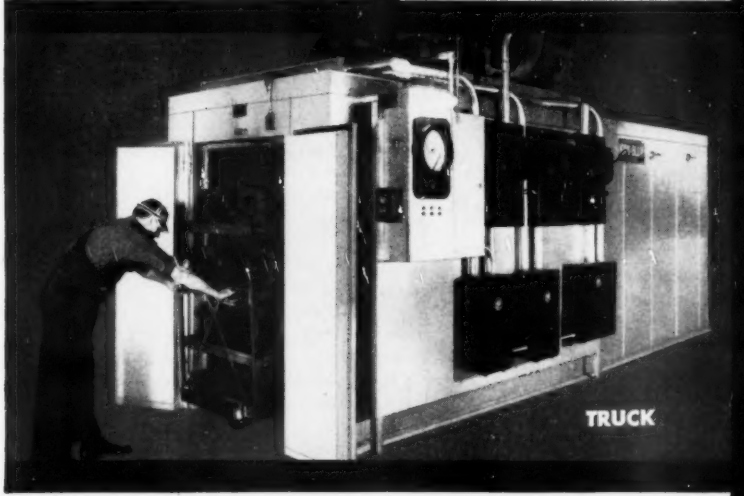
Compactly designed and expertly engineered to meet specific requirements, these typical installations show the wide range of KIRK & BLUM experience over more than 47 years. Often, ovens up to freight car size are shipped assembled, ready to operate.

Put this skill and experience to work on your industrial oven problem. For complete information and booklet, write: The Kirk & Blum Mfg. Co., 3189 Forrer St., Cincinnati 9, Ohio.



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Controls, Auxiliaries, Safety Devices For Rotary Oil Burners

Quick once-over on the necessary controls and other devices that should be specified for fully automatic horizontal rotary oil burners . . . Controls needed for burners using light oil . . . More controls needed on units using heavy oil

By **WILLIAM W. GAYLORD**, Consulting Engineer

FULLY AUTOMATIC horizontal rotary oil burners are extensively used in the commercial and industrial fields where demand requires the use of from 15 to 150 gallons of oil per hour.

Most of these burners using over 30 gal per hour or 50,000 gal per year are designed to use No. 6 fuel oil. This necessitates preheaters and the necessary operating and safety controls peculiar to heavy oil burning.

It has been the practice in the past, and still is to a large extent, for the oil burner maker to supply a part of the controls, auxiliaries and safety devices as standard burner equipment and for the contractor installing the burner to supply and install the rest to meet the requirements specified by the purchaser.

This particular practice has often resulted in the installation of controls, auxiliaries and safety devices which, while they would technically meet the specifications, were not well coordinated and were very difficult to adjust and keep in satisfactory operation.

Several of the burner manufacturers are now offering what they call "Packaged" or "Factory Coordinated" units in which they furnish not only the burner but the auxiliaries and controls either partly or completely factory assembled.

These can, and often do, go a long way to improve and simplify the installation but a careful check must be made to see that they provide all the controls and auxiliaries that are necessary or desirable. The location, arrangement and spacing of these should also be checked to insure that they provide for convenient inspection, maintenance and servicing of each of the units.

In order to insure a well coordinated system it is well to list what the controls and safety devices must do to insure safe and satisfactory operation and the auxiliaries necessary to accomplish this work as efficiently as possible.

For Non-Preheated Oil

For Burners Using Oil That Does Not Require Preheating:

A master control to start and stop burner as required for services expected. This can be a pressure control, a room thermostat or an aquastat depending on service.

In addition to this there must be: a high pressure or temperature limit control to stop burner in event of too high pressure or temperature; a low water cut-off to prevent the oil burner from running with insufficient water in the boiler.

A flame control which monitors both the main and pilot flames and does not allow the main fuel valve to open unless the pilot flame has been established is also needed. This instantly shuts off the burner upon failure of the main flame.

"Our PC Glass Blocks will pay for themselves in 7 years,"

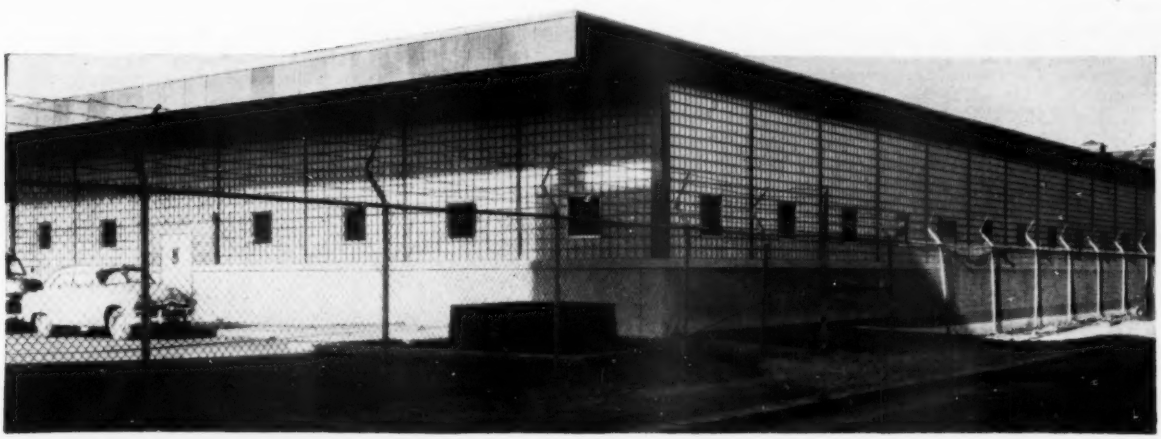
says

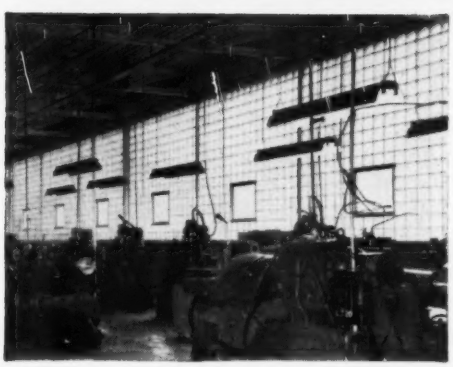
John A. Wilson
President
New England Butt Company
Providence, Rhode Island

IN 1952, the New England Butt Company put a new addition on their building, but it was *not* the same kind of addition they built in 1940.

The old addition was hard to heat. In fact, Mr. Wilson says, "We were never able to heat the early addition properly on cold, windy days, because there was too much heat loss through the steel sash."

How about the new addition? According to Mr. Wilson, "The heating problem has been solved in the new building, to the point that we figure the PC Glass Blocks will pay for themselves in 7 years. Our employees have plenty of light without glare or drafts. The window maintenance problem has practically vanished."





You can get the same results. In new buildings or old, PC Glass Blocks will cut your heating costs, cut your window maintenance costs and give better daylighting than you ever thought possible. For more information, write to Pittsburgh Corning Corporation, Dept. PG-74, One Gateway Center, Pittsburgh 22, Pennsylvania.

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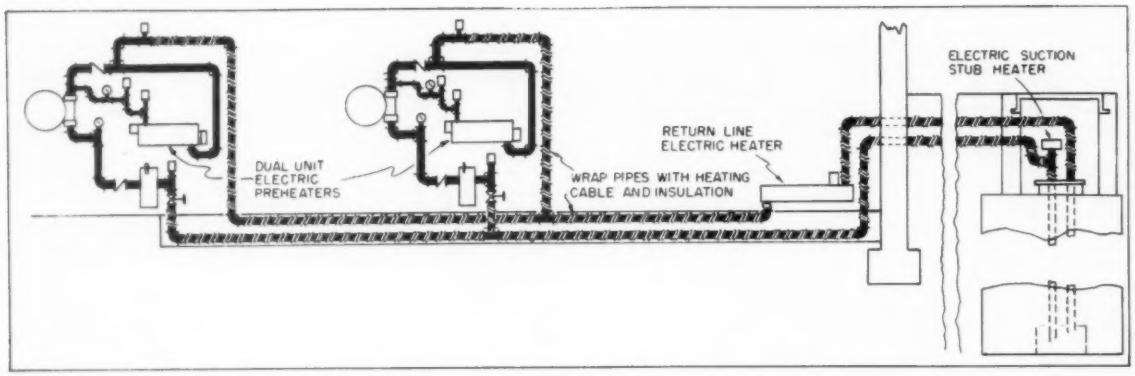

This sketch shows a typical all-electric heating system, for heavy fuel oil, using heating cable as source of energy

Each electric preheater must be sized to heat oil at the maximum burning rate of its burner from 100 F to the maximum burning temperature recommended by the burner maker and must be wired into burner controls. Suction and return pipes should be wrapped with electric heating cable so spaced that it will maintain a temperature of 120 F in pipe with a ground or air temperature of 60 F. Insulation is to be applied over a wrapping of heating cable of sufficient thickness to secure maximum heating effect of cable. Each length of heating cable to be controlled by its own thermostat having remote bulb in contact with pipe. Return line electric heater must be of sufficient capacity to heat oil at the full burning capacity of all burners through a 100 F temperature rise and to be controlled by its own thermostat. Suction stub heater to be of the proper size for oil suction pipe and tank to be controlled by its own thermostat. Heating cables, return line heater and suction stub heater to be wired to a special panel which is so arranged that the units are supplied with power at all times.

Burners should be equipped for low fire starting. Modulating flame control is very desirable in the smaller sizes and essential in large sizes.

Some form of draft control should also be provided. This can be a simple barometric draft adjuster to hold the draft reasonably constant. This is a sequence type which will not allow burner to start except with damper wide open. The control then maintains a suitable draft while the burner is operating and a low draft when burner is in off cycle. You can install one of the haze gage type with sequence relays which closes damper in off period, opens damper wide for start, and controls damper to give efficient operation when burner is running.

Controls for Bunker "C"

For Burners Using Bunker "C" or No. 6 Fuel Oils:

All of the controls, auxiliaries and safety devices used for the non-heated oils must be used and several more must be added as these oils must be properly heated before they can be burned efficiently.

First, the burner must be designed to pump the oil through the oil heater and have a built-in control that will not allow any oil to be delivered to the burner cup until it has been heated sufficiently to be properly atomized.

Second, there must be some form of viscosity or volume control built into the burner so that a constant volume of oil will be delivered to the burner cup regardless of the variations in the viscosity of the oil received by the burner pump.

Third, proper oil heaters must be installed to keep the oil in the storage tank at a temperature at which it can be pumped to the burners and then heat it to a temperature at which it can be properly atomized. These heaters must be thermostatically controlled so that the oil will be kept up to a proper temperature but not overheated.

The type and arrangement of the oil heaters installed will depend to a large extent on the services for which the boilers fired by the oil burners are intended.

Where the boilers are to be kept in operation at all times so that either steam or hot water is always available for heating the oil a simple system using steam or hot water will be satisfactory. Often the hot oil returned to the tank from the burners will keep the oil in the tank warm enough to be pumped without installing any heating coil in the tank.

It is, however, good practice to install a suction bell with a small heating coil that can be used if the returned oil does not provide sufficient heat.

Where the boilers are not to be kept in operation all of the time, and particularly where the operation is liable to be intermittent with short on and long off periods, an electrical system of keeping the oil in the piping system warm is often most satisfactory. There are two general methods of keeping the oil in the piping system warm by electricity; one uses the piping itself as the heating element by passing low voltage, high amperage current through it between insulated joints and the other uses heating cable wrapped around the pipes. Both are generally used in combination with electric immersion heaters and often with steam or hot water heaters also.

The system using the piping as the heating element is patented and available from only one source and must also be completely engineered by the maker.

The materials for the other system can be purchased in the open market but the system must be engineered by the installer from data furnished with the equipment.

Either system can be installed so as to work very satisfactorily and entirely remove one of the principal objections to the installation of No. 6 oil burning equipment; that is, the difficulty of cold starts as warm oil is available whether the burner has been off for an hour or a week. For heating systems that are shut down for the summer the current for heating the oil is shut off and at the end of the season turned on 24 hours before it is desired to start the burners for the next season.

Heating Cable Method

The attached sketch shows a typical all-electric system using heating cable. As the heating cable will only hold the piping and the oil in it to the design temperature, usually about 120 deg, it is necessary to return enough hot oil to the tank at all times to raise all of the oil being pumped to this temperature.

If pump type burners, as shown in the sketch, are to be used, the burner pumps must have a capacity of at least 175 per cent of the maximum rate of the burners. In case the burner pumps do not have this capacity it will be necessary to install an auxiliary pump set and loop oil pumping system. In this case auxiliary pump set should have a capacity of from 175 per cent to 200 per cent of the sum of maximum burning rates of all the burners connected to the system.

LIGHTED STORAGE AREAS frequently can be used in place of costly indoor storage space when the material will not be harmed by weather. G-E floodlighting helps safeguard material and makes it more accessible for operations at night.

LIGHTED PLANT ROADS are safer, let traffic move efficiently during dark periods of the regular work shift. G-E floodlighting permits movement of raw materials to production areas at night when roadways are not congested with traffic.

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can expand the use of your plant work areas

LIGHTED PLANT YARDS are better protected against pilfering and trespassing, and help reduce costly employee accidents. G-E floodlighting of plant boundaries often reduces the number of guards and watchmen needed for plant protection.

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This bulletin has been designed to show you how to light your industrial work areas. G.E. also maintains a staff of trained lighting specialists who will be glad to help you with your lighting problems. Just contact your local G-E Floodlighting Distributor or send for this bulletin.

General Electric Company, Apparatus Dept.
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GENERAL ELECTRIC

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HYDRAULIC BUFFERS
Can Reduce Crane Accidents

These two recently-developed hydraulic buffer units designed as reliable trolley stoppers even at full-speed operation. . . . Automatic latching device resets the buffer for reoperation after work stroke has been completed

By W. H. LEHR, Engineer, Crane and Bridge Dept., Dravo Corp.

INCREASING FREQUENCY and severity of accidents involving bridge and unloader man trolleys have emphasized the importance of installing adequate buffer mechanisms on the structures. Simple spring or friction type buffers often are designed to stop a trolley traveling at reduced speed, rather than full speed, and are intended primarily to halt a trolley that already has been slowed by various limit switches. Placing full reliance, for stopping, on the brakes of a trolley also is hazardous because this method of deceleration requires friction between the wheels and the rails, which may not be possible if wet or icy conditions exist.

Two sizes of hydraulic buffers have now been developed for positive, safe deceleration of trolleys on bridges and unloaders. The first installation of this type was made on a 15-ton ore bridge, designed and built for an eastern steel producer. The man trolley of this bridge weighs 151,000 lb, exclusive of bucket and load, and its maximum speed is 900 fpm.

Two buffer units are mounted on the bridge span, one at each end of the trolley runway. Each unit is designed for a maximum stroke of 6 ft and will stop the trolley in a distance slightly less than this amount if the trolley is traveling at full speed on impact. Thus, the trolley will be stopped safely and surely, regardless of whether limit switch failures or weather conditions caused lack of deceleration at the end of the runway.

Each buffer unit on the bridge consists of two hydraulic cylinders mounted parallel to the trolley runway and connected by a bumper beam extending across the runway to contact the trolley frame. Arrangement of beam and cylinders results in the action of the trolley on the buffer piston being a tension pull rather than a compression thrust.

An automatic latching device resets the buffer after its work stroke has been completed. Upon impact with the trolley frame, the latching device fastens the buffer beam to the trolley frame. It remains fastened throughout the work stroke of the unit. When trolley travel is reversed, the beam and pistons follow the trolley until they are in their original position. Then, the latches are automatically released.

The operational portion of the hydraulic cylinder is a piston moving within a tight-fitting sleeve which has been perforated radially. When the buffer action starts, the cylinder is full of hydraulic fluid. The decelerating force is exerted by resistance of the sleeve orfices to passage of the hydraulic fluid through them at high velocity. The orifices, or perforations, are accurately spaced and sized to produce the desired piston force and, consequently, the rate of trolley deceleration.

At the beginning of the stroke, there are ample perforations to place the buffer beam and pistons in motion without severe shock. As the piston advances, the orfices are gradually covered. This restricts the area through which the fluid can escape and thus controls the forces built up in the cylinder which, in turn, govern the deceleration rate. The cylinder and piston are mounted in a steel housing which is fastened to the bridge structure.

In another installation for a midwest steel producer, space and weight considerations required a smaller and lighter buffer unit. A unit with two hydraulic push-type cylinders and piston-operating stroke of two feet was designed to solve this problem.

Fig. 1. Railroad flatcar, loaded with steel to make its weight equal to half that of a man trolley, as it was used in a test. The car, fitted with special built-up bumper, ran into buffer at several speeds and was stopped effectively every time

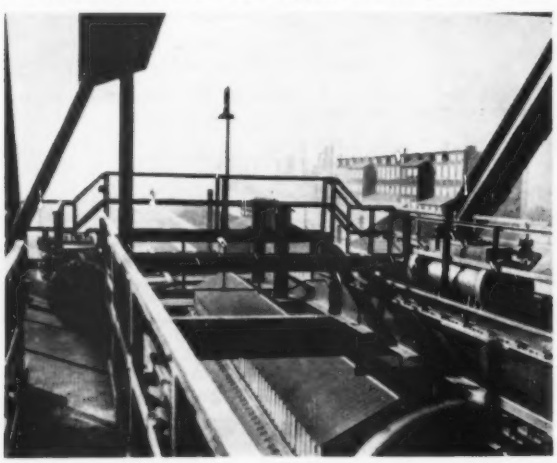

Fig. 2. Two six-foot buffers mounted at end of cantilever arm of an ore bridge connected by a cross beam extending across runway. Trolley frame automatically latches to buffer cross beam and resets them when trolley travel is reversed

The Petroleum Industry . . . wants a good, all-purpose wiper that can be efficiently located in refineries and plants. Because Scott Wipers come in handy boxes, they make for easy one-way distribution and simpler control.

The Heavy Machinery Industry . . . calls for a rugged wiper. Scott Wipers are strong—they are two-ply. For even more strength, two or three can be bunched together.

For your men... for your machines

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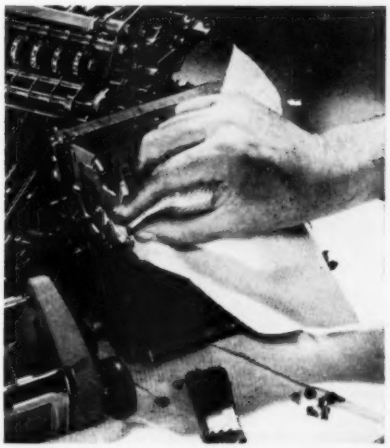
Many, many companies are now using Scott Industrial Wipers in their wiping operations.

Scott Wipers are appreciated by *all* employees—for their versatility, their cleanliness, their strength, their absorbency, and for their safety.

And with Scott Industrial Wipers you can budget the wiping operation in your plant.

A Scott specialist is at your service—to talk to you about this revolutionary product. Simply mail the coupon or get in touch with your local Scott distributor.



The Service and Utility Industries. In the powerhouse or the repairman's toolbox, Scott Wipers are proving themselves in these industries. They're easy to carry, easy to use.

The Hands of Production—your most important tools—are protected by disposable Scott Wipers. Harmful metal chips and filings are thrown away along with the used wiper.

Scott Industrial Wipers—another Scott product that is changing America's way of doing things.

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Please send me full information on Scott Industrial Wipers

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Northrop Redesigns Cafeteria To Handle More Employees

It would be rather difficult to equip a plant cafeteria with expandable walls to take care of an increase in employment . . . The next best thing—and Northrop has done just this—is to redesign the cafeteria to feed more people

Before This is how the cafeteria looked before it was redesigned. Floors under booths were hard to keep clean. Even with daily cleaning, food particles and dust collected in the corners. Cafeteria interiors were drab

After The unsightly gabled ceiling was sealed off with a false ceiling of sound-absorbing wallboard. Tables replaced booths and simplified job of cleaning the floor. Lighting is provided by fixtures made at Northrop

CAFETERIAS built in the urgency and austerity of wartime somehow fail to keep pace with plant growth. This was the case at Northrop Aircraft Inc., Hawthorne, California, and may be similar in other industrial plants throughout the country.

From a wartime peak employment it tapered off until in 1946 the company had about 6000 workers. Then, employment steadily trebled—from 1946 until this year—to 19,000. A survey showed that less than 30 per cent of all employees were using the company's two main cafeterias. Complaints streamed in to the Industrial Relations office. Something had to be done—Northrop did it.

One day last month a field editor sat down with Northrop's manager of cafeterias, F. E. Wolfe, and got the whole story first hand.

Editor: You say redesigning your cafeterias upped patronage drastically?

Wolfe: That's right. We modernized our main cafeteria, upped seating capacity by 100.

Editor: How much did it cost to modernize the cafeteria to accommodate this larger patronage?

Wolfe: About $6200 and that covered remodeling both cafeterias.

Changes Needed

Editor: You told me earlier that some drastic changes were needed.

Wolfe: They certainly were. We surveyed the cafeterias. Took a critical look at them, just as we do when we're faced with a production problem. Our survey—really a detailed analysis—showed that our cafeterias' interiors were drab and uninteresting. Walls were sheathed in dull wallboard. The clatter of dishes was unpleasant during rush hours.

Editor: What about seating capacity?

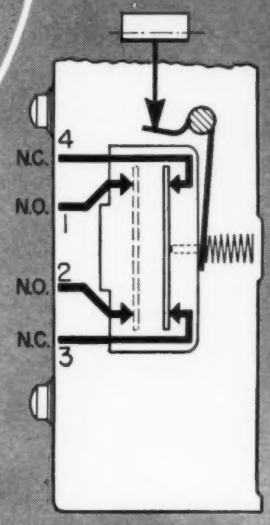
Wolfe: Our main cafeteria, for example, could seat only 450 simultaneously. That was because booths were installed. Floors under booths were hard to keep clean. Food particles and dust collected in the corners. This happened even with daily cleaning.

Editor: What conclusions did you draw from the survey?

MICRO SWITCH Precision Switches

A PRINCIPLE OF GOOD DESIGN

New MICRO SWITCH two-circuit, double-break, sealed head limit switch



Circuit Arrangement

Here's a NEW MICRO SWITCH Two-Circuit, Double-Break, Sealed Head, Heavy Duty Precision Limit Switch

MICRO SWITCH heavy duty limit switches have long been favored by plant engineers and maintenance men to make present equipment more automatic, safer and more productive.

This new two-circuit, double-break, sealed head switch makes it possible to apply this versatile switch to applications that require the switching of two isolated circuits. The switching unit is protected by enclosure in a sturdy aluminum housing. Seals are provided to keep out oil, water, grit, chips or other foreign matter.

The roller arm actuator is adjustable through 360 degrees to any of 870 positive lock positions. The entire head is adjustable to any of four positions at 90 degree intervals. Electrical rating is 10 amperes, 110, 220 or 440 volts a-c.

There are 180 MICRO SWITCH distributors located in 161 key cities to supply this new switch or any of the wide variety of MICRO SWITCH products for limits, safeties or interlocks. Locate him under "Switches, Electric" in your phone book.

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

FREEPORT, ILLINOIS

H HONEYWELL

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This view shows how the feeding lines were arranged previously. The snack and salad bar and dinner line have now been replaced by four feeding lines: grill line; dinner line; and two a la carte lines. This arrangement has helped speed up service

Wolfe: We decided to: (1) tear out the booths and put in tables—eight places to a table; (2) change over from a system where the cafeteria personnel bussed dishes to a self-bussing system; (3) install four separate lines: grill line, with 30 items, all cooked to order, and capable of handling six customers a minute; a complete dinner line, with salad and dessert, to serve eight people a minute; and two a la carte lines, handling 10 customers each minute, and with a choice of two entrees.

Patronage Pickup

Editor: How about results which you called "psychological"?

Wolfe: The cafeteria's unsightly gabled ceiling was sealed off with a false ceiling of sound-absorbing wallboard—which cut down the dish noise. Lighting and ventilation were provided by novel, inexpensive fixtures (made here at Northrop) which also broke the monotony of the ceiling. The Industrial Engineering department came up with turquoise blue for the lower 4½ ft of the walls. The upper portion of the walls was painted a "warm" blue-gray to add contrast and eye comfort. We tore out the booths, remade them here at Northrop into tables. Table tops were painted alternately light yellow and blue green. The ceiling was also painted yellow—but even lighter.

Editor: Did you notice any immediate patronage pickup after remodeling?

Wolfe: Did we! The very first month after remodeling, employee patronage jumped to 40 per cent of our total employment and has remained at about that figure since.

Editor: What about those who still don't patronize the cafeteria?

Wolfe: No plant cafeteria expects all employees as customers. Some people like to get out of the plant for lunch. Some find it cheaper to bring their lunches. Even though we operate non-profit, we can't compete with a really thrifty wife's lunch-bucket. Then there are some who just don't like cafeteria atmosphere—no matter what cafeteria.

Editor: What about the self-bussing system? I notice it seems to work smoothly here.

Wolfe: Yes, it does. We called in an engineer from a restaurant equipment dealer because we wanted the benefit of his experience. Engineering-wise it's important that the "landing area"—where patrons leave their trays and dirty dishes—is large enough to accommodate a full cafeteria load. Our landing area is about 30 ft long, 4 ft wide and 3 shelves high. Ample space.

Redistribution of Help

Editor: What about cafeteria employees who had been picking up dishes?

Wolfe: Our almost immediate increased patronage absorbed them all on the serving lines. Actually, even with this increased patronage our per shift kitchen staff hasn't changed. We have 10 people working there, and have just put in a new dishwashing machine with automatic feed. It's much bigger than our previous model.

Editor: You said that by tearing out booths and replacing them with tables you are now able to seat 100 more diners?

Wolfe: Yes, about 550 now instead of 450. Of course, it's obvious that even with two cafeterias of this size and even with our snack bars and mobile units (we have three food stands and 4 mobile chuck wagons), we couldn't handle the entire plant.

Editor: You stagger lunch periods?

Wolfe: Yes, production workers start their 45 minute lunch periods at 11 a.m. Office workers begin theirs at 12:00, with 15 minutes between sections.

More, Bigger Machines

Editor: How has the kitchen been able to keep up with this increased patronage?

Wolfe: Mainly because we've shifted and streamlined operations. More cooks and bigger dishwashing machines have meant fewer workers in the dish room, more over the ranges. We have five ranges, two fryers, a grill, broiler and three steam kettles. And of course, separate kitchen sections for supply, vegetable preparations, butchering and refrigeration and dry storage. We don't do our own baking, however.

Editor: Has the kitchen been up to its assigned job?

Wolfe: Sure has. Our cafeterias and other in-plant food facilities handle 12,000 transactions a day! That's a good deal more than any half dozen commercial cafeterias. We open at 5 a.m. and close at 10:30 p.m., and serve continually throughout the day.

Editor: I notice that the lines move rapidly, even when a big shift is on.

Wolfe: We have a jam-up occasionally, but on the whole our three speed lines handle the crowds nicely. I have my office—with observation window—right off the line. I can see everything to make sure no snags crop up.

Editor: What measures of success other than tremendously increased patronage have you?

Wolfe: Complaints have decreased to a minimum and fewer people are bringing lunches from home.

Editor: Maybe some plant managers will be asking, "Why should a plant concern itself if its cafeteria patronage is skidding downward?" Can you clear that up?

Wolfe: Any plant wants to provide its employees with a pleasant noon-hour and between-shift eating place. If employees aren't patronizing your in-plant food service facilities, you're falling short. A cafeteria is one of your plant's "recreation centers." Besides, here's the one place that you, by careful planning, can insure well balanced meals at reasonable prices. Our increased patronage since remodeling is proof that we caught the trouble in time—and overcame it.

"Glasfab gives our roof maintenance-free protection"*

SAYS REED MILK & ICE CREAM CO., SHAMOKIN, PA.

To resurface roof, plant crew merely spread coating on top of Glasfab. Open weave of Glasfab assures penetration and firm bond to old surface.

Courtesy Maintenance Materials Co., Euclid, Ohio.

Use of Glasfab on this 8000 sq. ft. roof of dairy plant halted bad leaks, produced long-wearing surface.

*The **Glasfab system of roof maintenance** provides long-lasting, water-tight protection for roofs. Glasfab fiber glass membrane reinforces coatings so effectively that a 10-year roof life can be expected without recoating.

Glasfab's performance on the roof of the Reed Milk & Ice Cream Co., Shamokin, Pa. resurfaced in 1948, is typical. But here, let this company tell you about its roof. . . . "*Since our roof was leaking badly at the time, we installed this system on our milk and ice cream plant. The roof has just passed its sixth full year of maintenance-free protection and shows no evidence of deterioration . . . we are very well satisfied with the quality and permanence obtained with this system . . .*".

This reroofing job was done by the regular maintenance crew—proof of Glasfab's simple, foolproof installation.

Wherever Glasfab is put to work you can forget about leaks, blisters and other roof ailments. Glasfab produces a flexible roof surface that is tough and waterproof—and stays that way despite punishing roof traffic. Glasfab's strong and virtually indestructible glass fibers are woven into an open mesh for best reinforcement.

For economy, for long life, for trouble-free and care-free roofs, specify Glasfab . . . it's "*tops for topside protection*".

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For more facts circle 572 on Reply Card

Standby Propane Fuel System Essential to Offset Utility Restriction at New Plant

WITH PUBLIC UTILITY gas supply assured in the plant mains only during eight months of the year, most of the winter months' gas requirements at Caterpillar Tractor Co.'s new plant at York, Penna., are met from a liquefied propane installation.

Much of the gas is used in the annealing furnaces to treat the metal tread parts manufactured at York. In addition to the parts manufacturing function of the plant, it is also used to provide parts service to eastern and export customers.

At the time of its opening, the plant employed about 650 people, and the site included some 770,000 sq ft under roof. Extensive use is made of outside storage areas, to expand storage facilities without expensive warehouse construction.

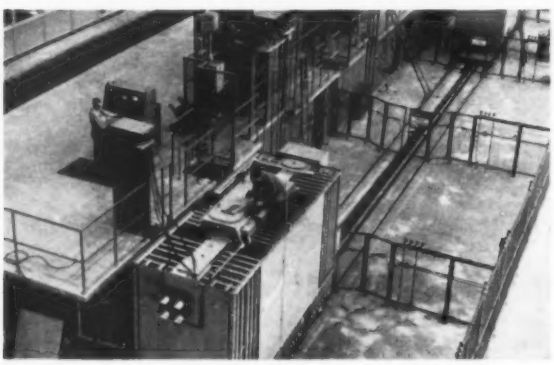
The elaborate heat treating facilities consume tremendous quantities of water, and two central water systems are included in the buildings. One system was installed for the quench water, and another for the cooling water used in

the heat treating equipment. Overflow water from the quench tanks flow into a central hot well, then into cooling towers on the roof. From the cooling towers, it goes back into service in the heat treat areas.

New Transformer Plant Features Production Line Manufacturing Methods

TESTING OF COMPLETED TRANSFORMERS, as well as the processes of their manufacture, are on a production line schedule at General Electric's new Medium Transformer plant at Rome, Georgia.

The units are moved through a series of 12 test berths by drag-line conveyor. At each berth, different tests are



made, including resistance, ratio, core loss, current impedance, potential and impulse tests.

Mechanization in the new 25-million-dollar plant is a radical departure from the job-shop methods usually employed in making units of this type. Transformers rated from 501 kva to 10,000 kva, 69,000 volts and below, will be produced at the plant.

Three types of conveyors—drag-line, moving sidewalk and elevated slat—extend nearly half a mile within the plant. Fifteen cranes of 10 ton or greater capacity, plus 40 cranes of one to five tons capacity complete the handling facilities. With these conveyors, new processes and new machinery, General Electric has succeeded in reducing by more than one third the manufacturing cycle for this size transformer.

The power transformers, each rated 7500 kva, supply the plant with electrical energy from the Georgia Power Company's 110,000-v transmission system. The voltage is stepped down to 13,800 v for distribution within the plant. There are 23 load center unit sub-stations throughout the plant for reducing the voltage from 13,800 v to 480Y/277 v for secondary distribution.

Modern Industrial Plant Adapts TV Screen Motif for Entrance

MANUFACTURING OPERATIONS and general offices of the Vapor Heating Corp., were recently moved into a new two million dollar plant in Niles, just outside Chicago.

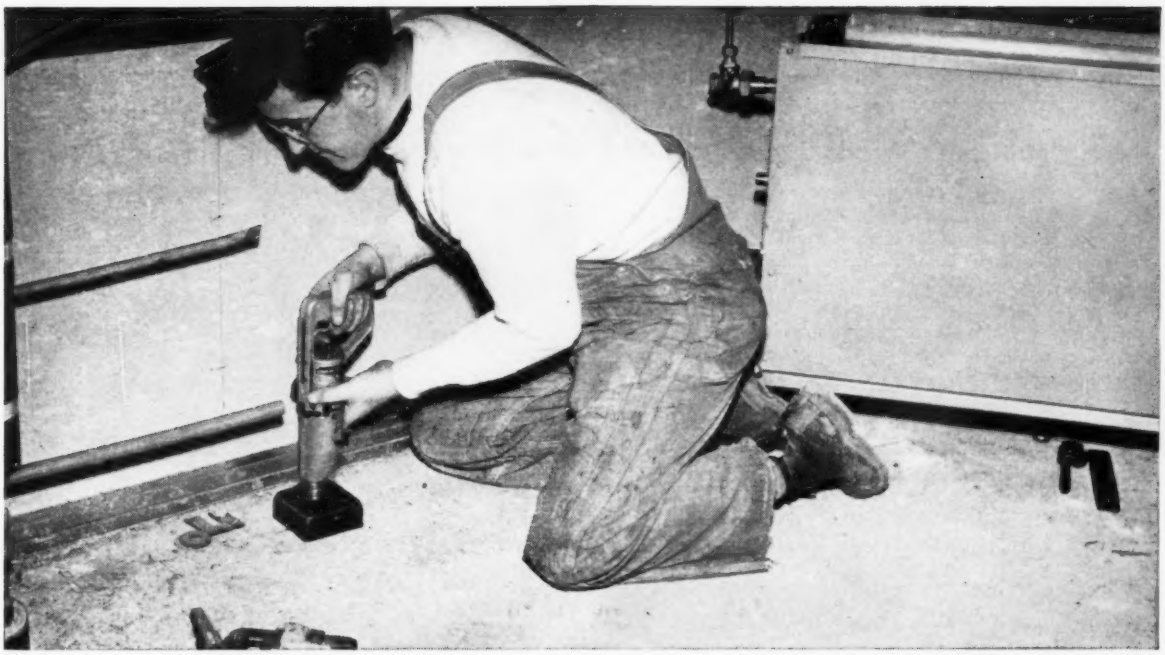
A major moving operation, the transfer of tools and materials from the former plant site filled 721 trailer trucks and 13 freight cars. The move was carried out on a carefully planned and scheduled basis, with the result that although single departments were shut down for three or four days, the plant as a whole did not lose a single full working day.

To handle the 300-ft lengths of steel pipe for steam generator coils without obstructing other manufacturing operations, a tunnel, five feet in height, was built under the floor.

As each 24-ft length of steel pipe is electrically butt welded, a friction drive machine pushes the pipe into the tunnel. The welded pipe, 250 to 300 ft long, is then ready

to be drawn out of the tunnel as it is cold rolled into a coil.

The structure, with its TV-screen main entrance, is built of brick and steel-reinforced concrete, one story high, enclosing about 220,000 sq ft of floor space.



Cut fastening costs up to 80% on heating and air conditioning installations...with the REMINGTON STUD DRIVER

"It saves us money on every fixture we install" —that's the kind of report we're getting every day on the Remington Stud Driver. Big savings just naturally result from the amazing speed of this powder-actuated tool. It sets as many as 5 studs a minute in steel or concrete!

You'll find real economy, too, in the fact that the Stud Driver is completely self-powered—no need for extra equipment, wires or cables. Compact and portable, the tool is designed in every way for easy handling. And since it weighs only 6 pounds, it's ideal for working overhead and in confined spaces.

What's your fastening job? Whether it's fastening pipe to walls and ceilings or anchoring fixtures to concrete floors, you'll save money with the Remington Stud Driver. For complete information on how to cut *your* fastening costs, just send in the coupon below.

QUESTIONS YOU ARE ASKING

QUESTION:

What are the studs made of?

ANSWER:

Genuine Remington studs are made of a selected molybdenum-bearing alloy steel, heat-treated for required hardness and ductility properties. All are plated for protection against corrosion.

"If it's Remington—It's Right!"

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Remington Arms Company, Inc.
Bridgeport 2, Connecticut

Please send me a *free* copy of the new booklet showing how I can cut my fastening costs.

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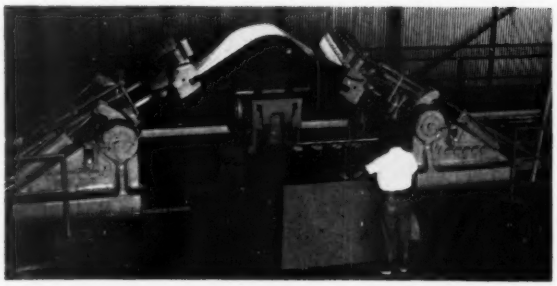
For more facts circle 573 on Reply Card

Metal "Stretcher" Wraps Sheets Around Dies to Form Aircraft Components

ONE OF THE NEW machine tools recently installed at Convair's San Diego plant is a 400-ton capacity Sheridan wrap-forming machine. It is the largest of its type on the West Coast, and can handle sheets of aluminum and other aircraft metals ranging in size up to 6 ft wide and 30 ft long.

To form an aircraft component, the flat metal sheet is inserted in the jaws at either end of the machine. Hydraulic pistons, controlled by a set-up panel, wrap the metal sheet around a die set between the jaws. The machine is so designed that it can form a part at a 180-deg angle, if required. Spring-back of the metal sheet is eliminated, and the machine produces an accurately formed part.



Design of New Plating Plant Considers Problem of Plating Wastes Disposal

ONE OF THE MAJOR PROBLEMS solved during the construction of the new plating plant of the Cadillac Division of General Motors Corp., Detroit, was the conduction and disposal of corrosive fluids and acids used in the plating process.

The chemical fluids used, such as chrome platers' solutions, chrome color dyes, and sulfuric acid in high concentrations, develop very fast and highly corrosive action.

Screw-Seal industrial clay pipe, manufactured by the Robinson Clay Product Co., Inc., Akron, Ohio, recommended as a permanent acid-resisting installation, was used in diameters of 4, 6 and 8 in. The pipe sections were merely screwed together to make long runs, and when connections such as elbows or tees were required, union joints were used with split flange collars.

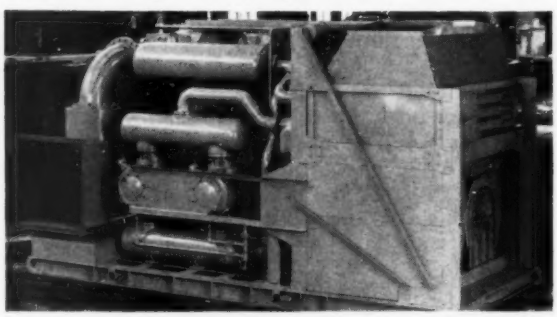
Compressor Plant Mounted on Railway Car for Mobility in Emergencies

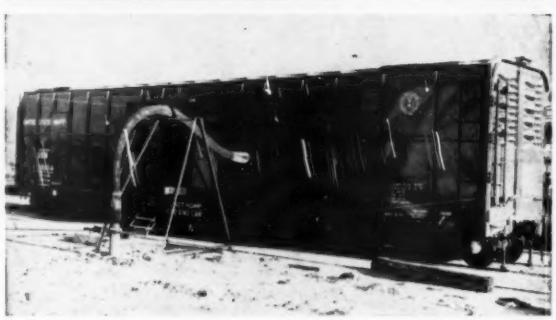
A PAIR OF HEAVY-DUTY air compressors, capable of supplying a combined volume of 5,000 cfm at a pressure of 125 psi, has been put on wheels. To meet specifications of the Navy's Bureau of Yards and Docks, Clark Bros. Co. of Olean, N. Y., constructed this mobile plant complete with 500-hp electric motors, switchboards, transformers, cooling systems and lubricating systems. Then, they fitted the 138,000 lb of equipment into a single 60-ft railway box car.

First mobile air compressor plant of this capacity ever built, it was designed to meet exacting requirements. Clark used two identical two-stage compressors, each with a capacity of 2500 cfm. To fit the space available in the box car, an adaptation was made of standard units, and produced a four-cylinder unit with the two low-stage cylinders vertical and the two high-stage cylinders horizontal.

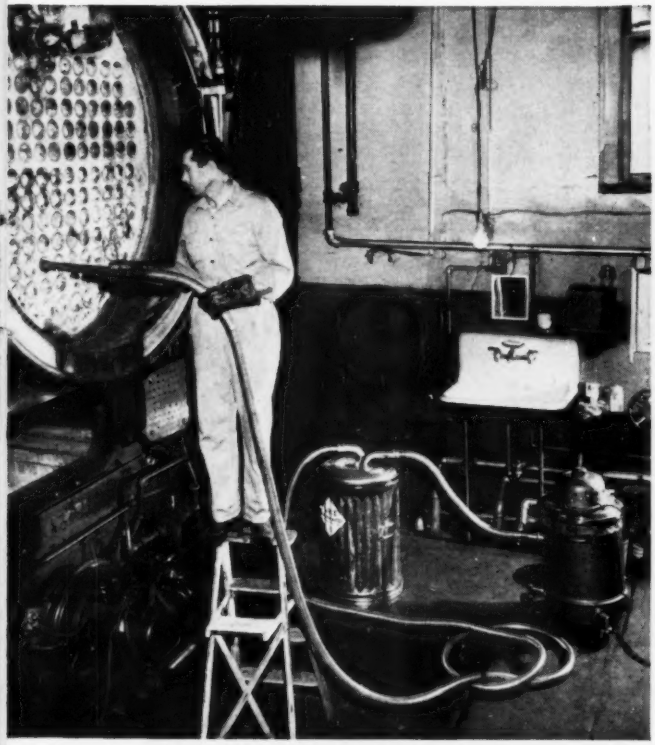
A compact, 500-hp synchronous motor mounted on the end of the crankshaft drives each of the two compressors. Motor bearing is built into the compressor and there is no necessity for a space-consuming outboard bearing. Also, the required WR^2 is incorporated in the motor rotor, thus eliminating the need for a fly wheel.

Each compressor is self-sufficient, complete with its motor, air, water, and lube oil systems, all mounted on structural steel skids so the entire unit can be pulled out of the car for major maintenance. Ports are provided in the side and top of the car to permit all normal maintenance without taking the compressor from the car.

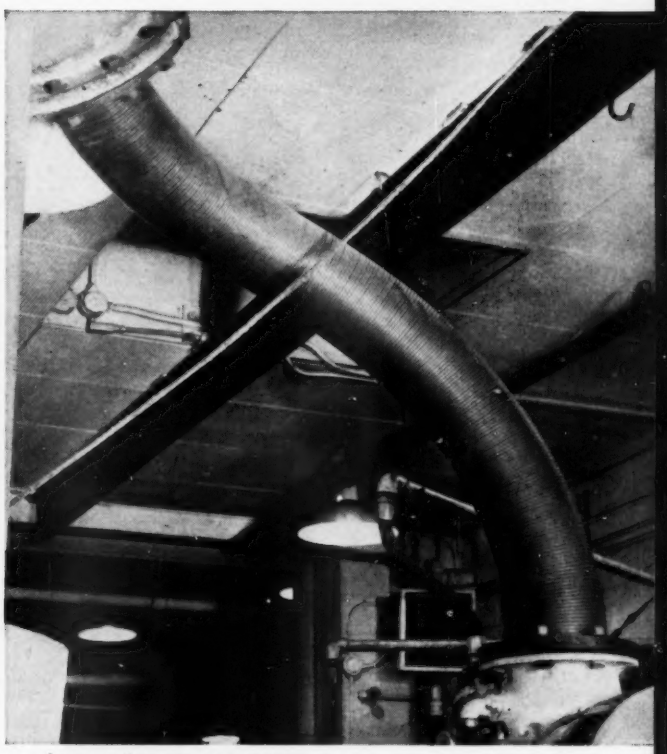




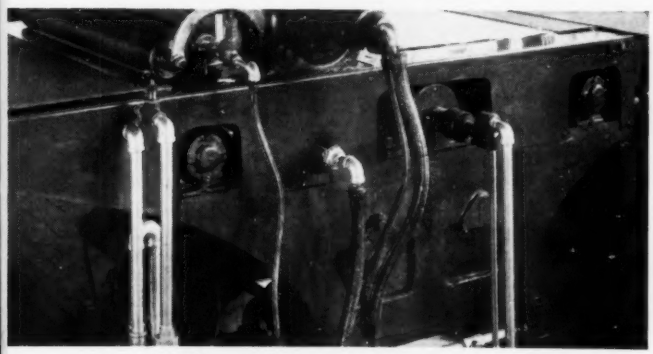
News about flexible metal hose and tubing



• • • in a chemical products plant. Empire Chemical Products Co., Newark, N. J., uses American Flexible Steel Vacuum Hose—1½ in. I.D.—to remove soot from boiler tubes. Specially designed for suction work, Type VAC is made with rubber or asbestos packing. Here, this heavy-duty metal hose is asbestos-packed. It's light, easy to handle and draw around obstacles, has a smooth exterior and is extremely flexible.



• • • in a motor car company. This length of 8 in. I.D. American Flexible Stainless Steel Vacuum Hose is packed with copper wire and fitted with special flanges. It carries away exhaust gases on diesel engine testing equipment at the Packard Motor Co., Detroit, Michigan. It's *flexible*, bends into desired position easily. And it allows for expansion and contraction caused by temperature changes up to 1500°F. in these exhaust lines.



• • • in a textile machinery company. Manufactured by the Grand Rapids Textile Machinery Co., Grand Rapids, Michigan, this "Roto Press," which is used to press garments, gets its steam through four lines of American Seamless Flexible Bronze Tubing. Two lines are ½ in. I.D.; two are ¼ in. I.D. Because American Seamless is "all-metal" it won't swell up, disintegrate or collapse under the tremendous heat of high steam pressures.

• • • on a frozen food display cabinet. The entire condensing unit on this model 390 XF Hill Frozen Food Display pulls out for quick inspection and easy repair . . . without disconnecting refrigerant lines -- thanks to American Seamless Flexible Bronze Tubing. One-piece construction of this tubing eliminates the hazard of refrigerant leaks under both high and low pressures. American Seamless is strong, flexible and 100% tight.

FREE BOOKLET! Quick-reference Catalog CC-400 shows how the tubing is designed, used and installed – gives specifications on tubing and fittings. Write for your copy today. *The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn. In Canada: The Canadian Fairbanks-Morse Co., Ltd.*

54197

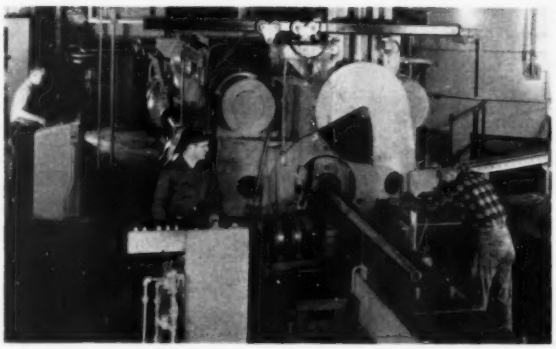
WHEREVER CONNECTORS MUST MOVE

AMERICAN

flexible metal hose and tubing—an ANACONDA® product

For more facts circle 574 on Reply Card

Big Extrusion Press Expands Non-Ferrous Seamless Tube Capacity of Mill

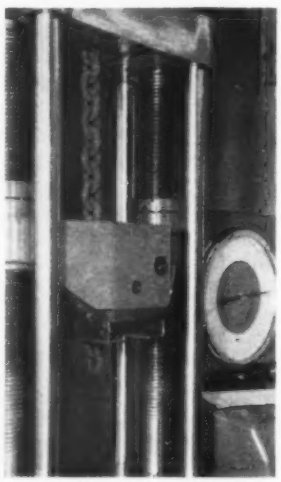


PRODUCTION FLEXIBILITY and capacity for tube stock have been greatly increased by the installation of a new horizontal extrusion press for drawing seamless tubing in one of the American Brass Co.'s Waterbury tube mills.

With double action power of 2300 tons—1900 tons on the main ram and 400 tons on the piercing ram—the press utilizes hydraulic pressure at 3000 psi. It will extrude round, solid billets up to 10 in. diameter to produce tube blanks up to 6⅝ in. diameter, weighing up to 350 lb.

Tube stock made on the press is processed by rolling and drawing to finished length and diameter, with intermediate anneals. The press is capable of extruding over 30 copper-base alloys, including plain and leaded brasses, aluminum brass and bronze, nickel silver alloys, phosphor bronze alloys, cupro-nickels, and copper-silicon alloys.

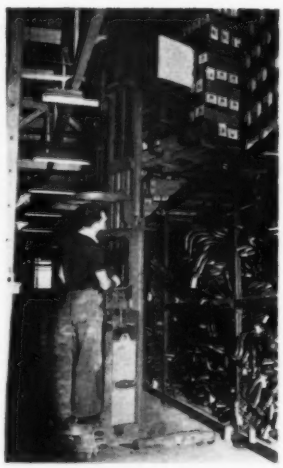
Hydraulic Tester Puts Chain to Work



FOR DESTRUCTIVE testing of its own McK-Alloy chains, the testing facilities in the quality control laboratories of the McKay Co., York, Pa., were recently augmented with a 300,000-lb capacity Riehle hydraulic tester.

This tester permits chains up to 1½ in. in size to be literally "pulled apart" under controlled laboratory conditions. After the chain is positioned in the tester, the load is applied in direct tension on a straight length at uniform speed, to determine the yield point and breaking strength of links.

Ford's Parts Depot Uses Special Trucks



HANDLING bulky items in confined spaces at the newly-opened Ford Chicago Parts Depot is simplified with a specially-designed reach truck. The truck manufactured by the Raymond Corp., operates easily in the narrow aisles, and can raise pallet loads to a height of 118 in.

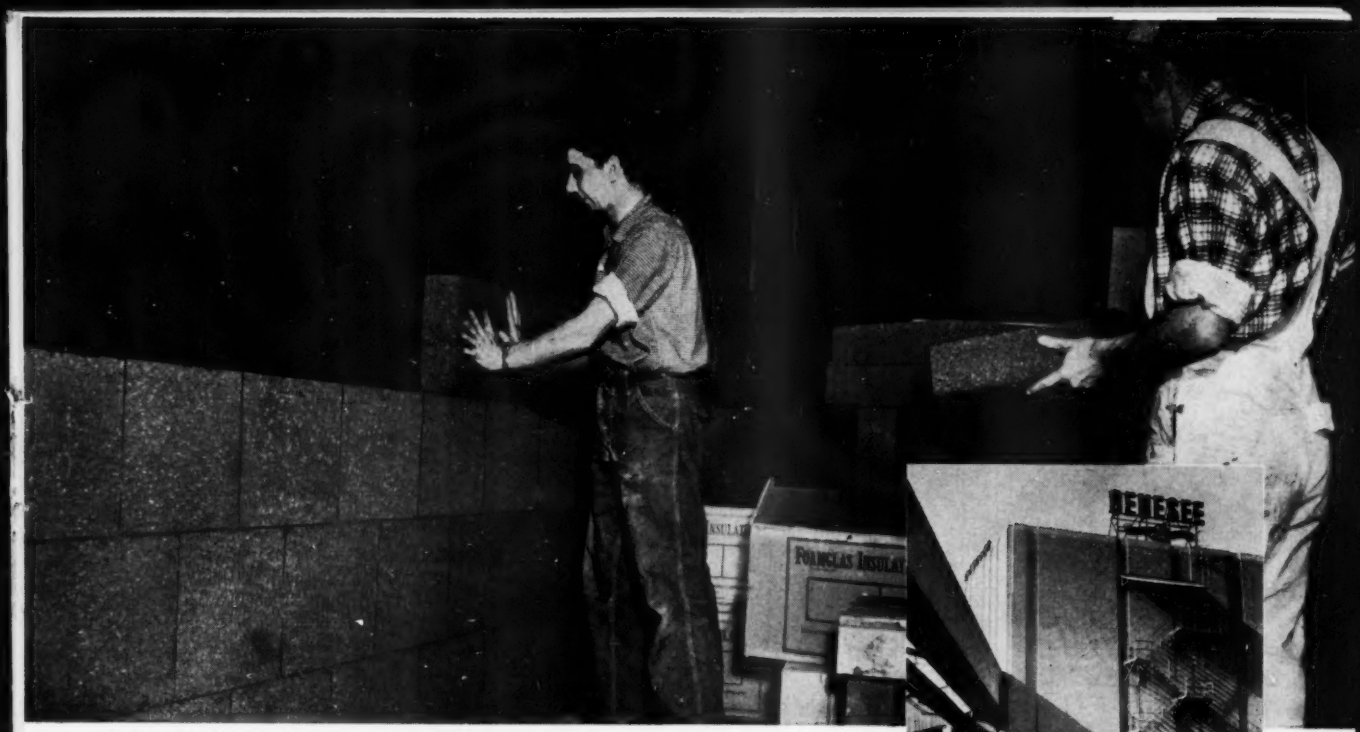
Ford employees of the depot keep the truck in almost constant use, handling the 360,000 parts shipped monthly. More than 16,000 different parts and accessories, some for models dating back to 1928, are stocked in the depot.

Specially Equipped Fork Truck Does Heavy Work in Changing Press Dies

AT THE STREAMLINED plant of Amana Refrigeration, Inc., which produces the Amana freezer, the steel panels for the cabinets are stamped out on hydraulic presses, and to meet production schedules, die changes are frequent. To avoid loss of valuable press time, rapid changeover is accomplished by means of a fork lift truck and special die unloader built by Towmotor Corp., Cleveland, Ohio.

The dies range in size up to 30 by 36 in. and weigh as much as 6,000 lb. The truck is used to carry the dies back and forth between the racks and presses, and for removing or placing the dies in position. It is kept busy transporting dies for about eight of the nine hours of the first shift, and for three hours of the second shift. The rest of the time, it is used for unloading sheet steel on the dock.

Photograph shows how Towmotor is used for positioning die in a 350-ton draw press. Unloader pushes die onto press bed, or, by reversing direction, withdraws it. Extension forks are carried in brackets in the sides of the truck for use when transporting sheet steel.



Lightweight FOAMGLAS blocks are easily installed on walls of Genesee's new storage building.

"We insulate with FOAMGLAS because it stays dry!"

Exterior of Genesee Brewing Company's new four story storage building, built in 1950 of glazed tile construction. All insulation is FOAMGLAS . . . on exterior walls, roof plus an insulated fermenting room inside.

states Lloyd B. Welch, Plant Engineer, The Genesee Brewing Co., Inc.

Mr. Welch points to one of many spots at which old insulation failed completely.

"FOAMGLAS plays a leading role in our plant expansion program because it *stays dry* to maintain constant insulating efficiency," reports Lloyd B. Welch, plant engineer at Genesee Brewing Company, Inc., Rochester, N.Y. "The strong, rigid, cellular glass blocks of FOAMGLAS enable us to use them in *free standing* construction permitting use of our insulated spaces while other construction work is still in progress."

Mr. Welch continues: "Our old insulation absorbed moisture and failed, but this presents no problem with FOAMGLAS which is impervious even to the heavy vapor concentration in the fermenting room of our storage building. There FOAMGLAS helps us maintain desired low temperatures with minimum maintenance to equipment and structure.

"With FOAMGLAS giving complete satisfaction in one storage building and a hops storage room, we'll definitely use it in a new storage building to be erected soon. We will continue to take full advantage of outstanding benefits from FOAMGLAS."

You, too, can do a better insulating job with moisture-proof, rat-proof, fireproof FOAMGLAS, the strong, rigid insulation that will give you long-lasting insulation service *plus* unique design advantages. Send now for our new booklets describing the use of FOAMGLAS for roofs, walls, ceilings, floors, piping and equipment. Use the handy coupon conveniently located below.

PITTSBURGH CORNING CORPORATION

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FOAMGLAS®

the cellular, stay-dry insulation

PITTSBURGH PC CORNING®

Pittsburgh Corning also makes PC Glass Blocks

For more facts circle 579 on Reply Card

Pittsburgh Corning Corporation, Dept. PE-74
One Gateway Center, Pittsburgh 22, Pa.

Please send me a free sample and the following brand new FOAMGLAS literature:

- ☐ New booklet on FOAMGLAS building insulation.
- ☐ New booklet on FOAMGLAS low temperature insulation.
- ☐ New folder on FOAMGLAS pipe insulation.
- ☐ New folder on FOAMGLAS insulation for tanks and other equipment.
- ☐ Send engineer to discuss specific problem.

Name _____

Company _____ Title _____

Address _____

City _____ Zone ____ State _____

CFI DAY-LINE®

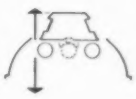
(COMFORT FOR INDUSTRY)

Easy to install

Easy to maintain

DOLLAR FOR DOLLAR, YOUR BEST PLANT LIGHTING BUY!

LOOK AT THESE VALUE-PACKED CFI DAY-LINE FEATURES!



COMFORT FOR INDUSTRY. Die-embossed apertures in reflectors provide 10% up-lighting for improved visual comfort and freedom from irritation and nervous fatigue due to eye-strain.

ALL-WHITE PORCELAIN REFLECTORS. Outside as well as inside, entire one-piece reflector is finished in snow white porcelain enamel—providing maximum high reflection surface.

COOLER, CLEANER OPERATION. A gentle flow of air passes through the apertures reducing dirt and dust deposits. This "breathing" action keeps fixture cooler, cleaner and more efficient.

TURRET* SOCKETS. Sturdy, vibration-proof Turret sockets are standard equipment on all CFI DAY-LINEs—providing positive lamp seating and simple lamp installation or removal.

*® G. E. Co.

THE CFI DAY-LINE ON THE JOB. Note how uplighting cuts down uncomfortable brightness contrast. CFI DAY-LINE is available in 2 and 3 lamp (75W) open-end 8 ft. Slimline units; 2 and 3 lamp (40W) open- and closed-end 4 ft. RAPID-START Fluorescent units; 2 lamp (90W) open- and closed-end 5 ft. Fluorescent units with NO-BLINK starters.

Day-Brite Lighting, Inc., 5439 Bulwer Avenue, St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

"DECIDEDLY BETTER"
DAY-BRITE®
Lighting Fixtures

470

SEE YOUR LOCAL ELECTRICAL CONTRACTOR

For more facts circle 576 on Reply Card

NEW BULLETIN 34 Simplifies Selection of Conveyor Chains and Moderate Speed Power Drive Chains

DIAMOND
DOUBLE PITCH CHAINS & SPROCKETS
For Conveying and Power Transmission
BULLETIN No. 34
DIAMOND CHAIN COMPANY, INC.
INDIANAPOLIS 7, INDIANA, U. S. A.
DIAMOND POWER TRANSMISSION CHAINS
Drive Series Double Pitch Power Transmission Roller Chains
Figure Eight Contour Links
DIAMOND POWER TRANSMISSION CHAINS
Horsepower Ratings Double-Pitch Power Transmission ROLLER CHAINS
DIAMOND CONVEYOR CHAINS
Sprockets for Conveyor Chains with Large Rollers
DIAMOND CONVEYOR CHAINS
Conveyor Chains with Extended Pins
Straight-Sided Linkplates
DIAMOND CONVEYOR CHAINS
Steel and Bronze Conveyor Chains
Attachment Links for Conveyor Chains

Precision-made conveying media are important in modern conveyor systems, sorting, timing and feeding mechanisms and for the handling of materials, containers, parts in process. For such functions, Diamond Double-Pitch Conveyor Chains are made in a great variety of types and sizes. Attachments can be located at intervals desired and may be of the bent or straight type, extended pin, pusher or cradle type. For moderate speed transmission of power the Diamond Double-Pitch Power Transmission Chains provide light weight with complete dependability, and long life, attractively priced.

The 32 pages of New Bulletin 34 carry illustrations and complete tables for easy selection. Just off the press, a copy is yours for the asking. Tear out the coupon reminder now.

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana

Offices and Distributors in all Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS OR CHAINS-ROLLER

DIAMOND
DOUBLE-PITCH CHAINS AND SPROCKETS

TRADE ◆ MARK

For more facts circle 581 on Reply Card

CLIP COUPON AND MAIL!

Diamond Chain Company, Inc.
Dept. 614, 402 Kentucky Ave.
Indianapolis 7, Ind.

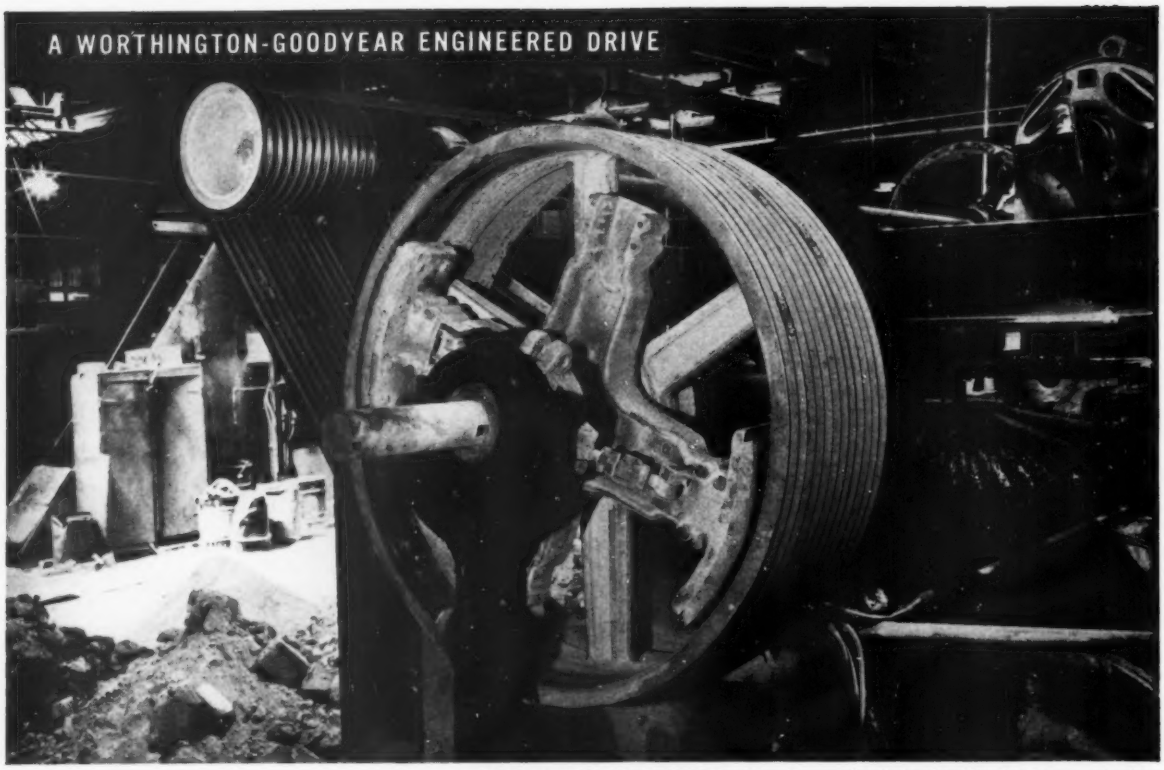
Please mail a copy of your New Bulletin 34 to:

Name_____

Firm Name_____

Address_____

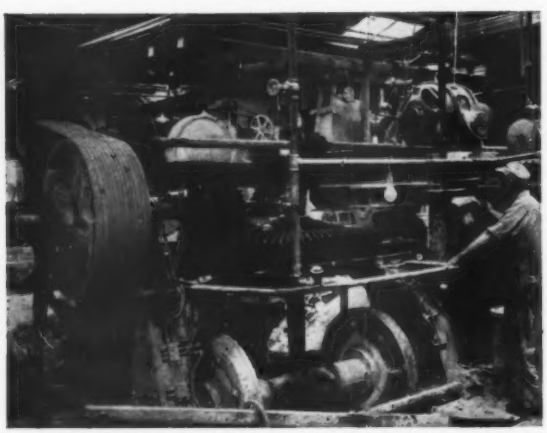
City_____ Zone____ State_____



WORTHINGTON MULTI-V-DRIVE takes heavy shock loads at R. C. Remmey & Son.

Belts hold as machine crushes 120-lb lumps

Worthington distributor solves critical drive problem for refractory



SMOOTH, NON-SLIP DRIVE for this wet-pan is provided by Worthington QD sheaves and Goodyear V-belts.

Driving a machine that crushes, mixes and tempers crude clay is a real workout for any mechanical power transmission setup — especially with lumps weighing as much as 120 pounds.

That's just what the R. C. Remmey & Son Company, Philadelphia manufacturers of refractories, ran up against in driving their 20-hp wet-pans.

About two years ago, R. C. Remmey & Son started looking for a replacement drive for one of these wet-pans. They contacted the nearest Worthington distributor who recommended Worthington QD* sheaves and Goodyear open-end V-belts.

Now, after two solid years of operation *not one belt has been replaced or tightened.* There's no noise, no slippage of belts on sheaves, and no power loss — which means maximum production. Because of this fine record, R. C. Remmey & Son is planning to install Worthington Multi-V-Drives on other wet-pan pulverizers.

Find out how this Worthington-Goodyear drive team can pay off for you, too. Write us. Worthington Corporation, Section MV.4.2, Oil City, Pa. **Reg. U.S. Pat. Off.*

MV.4.2

WORTHINGTON

BUY THESE WORTHINGTON STANDARD PRODUCTS FROM YOUR LOCAL DISTRIBUTOR

Compressors • Pumps • Multi-V-Drives • Variable Speed Drives

For more facts circle 578 on Reply Card

This MARLEY Cross-Flow has no secrets from the operator . . .

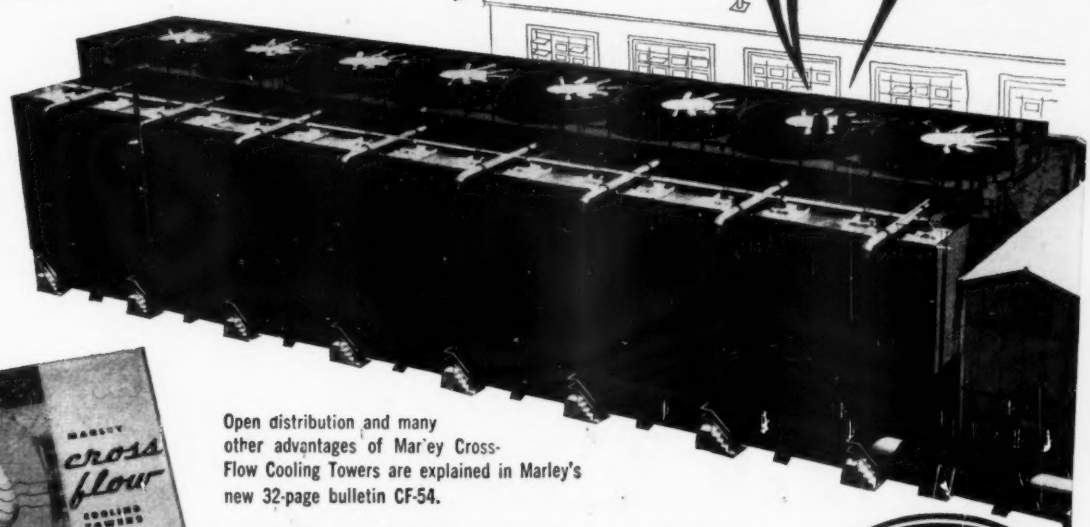
Open gravity distribution is one of the exclusive design features of Marley Cross-Flow cooling towers that makes them so "easy to live with" — and so economical to operate.

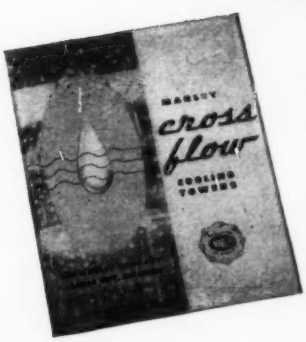
Is the water loading correct in every basin? Is the water flowing freely to every part of the tower fill? Are the basins clean? One glance and the operator of a Marley Cross-Flow has all the answers. And he takes that glance while making his inspection from a safe walkway. There is no need to subject himself to the hazards and discomfort of climbing into the tower to ascertain conditions.

If a change in water loading is desired, the valve is at hand and the variation in flow is visible. Since no pressure is required, increase or decrease in flow will not impair operating efficiency. No part of the fill will be starved; no part of the fill will be flooded.

Should a basin require cleaning, it is the work of minutes to shut down only the basin needing attention, clean it with complete safety and restore it to operation.

. . . a single glance tells you where you stand!





Open distribution and many other advantages of Marley Cross-Flow Cooling Towers are explained in Marley's new 32-page bulletin CF-54.

WRITE FOR FREE COPY TODAY!

The Marley Company

Founder-Member Cooling Tower Institute Kansas City, Missouri

MARLEY

For more facts circle 575 on Reply Card

Lift with AIR

GET THESE ADVANTAGES

CONTINUOUS SERVICE
without injury to motor

CAN'T BURN OUT
from being stalled

CAN'T OVERHEAT
from rapid reversals

NOT AFFECTED
by dust or fumes

THAT ALL ADDS UP TO

LOWER MAINTENANCE

plus

CONTROLLED SPEED
variable from 0 to 17 fpm

LIGHT WEIGHT
1,000 lb hoist weighs 28 lb

300, 1,000 and 2,000 lb capacities

KELLER AIR HOISTS

KELLER TOOL COMPANY • 1327 FULTON ST., GRAND HAVEN, MICH.

For more facts circle 580 on Reply Card

Full Line of Enclosures—

where bolted enclosures are a must, specify Allen-Bradley trouble-free starters

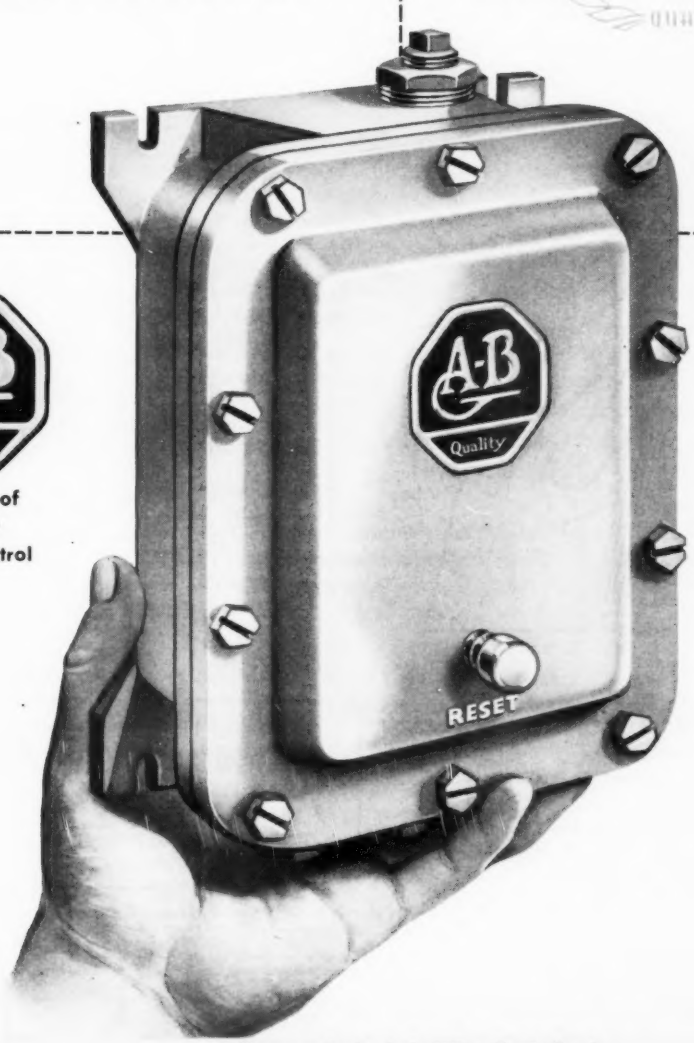
It is never easy to inspect control apparatus when installed in cabinets that require bolted covers.

Maintenance men know from experience that Allen-Bradley switches with double break, silver alloy contacts will operate month after month without requiring even contact inspection. They also know that the simplicity of Allen-Bradley starters assures trouble-free mechanical operation. It is, therefore, only natural for plant engineers to favor Allen-Bradley control—it saves their time.

Where you have a location requiring bolted safety enclosures, specify Allen-Bradley—and eliminate unnecessary inspection costs.

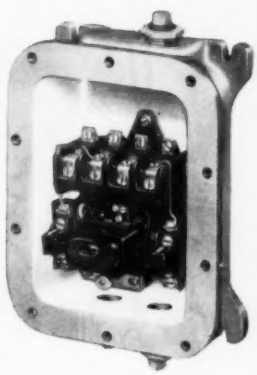
Allen-Bradley Co.
1317 South First Street, Milwaukee 4, Wis.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL



A-B Quality

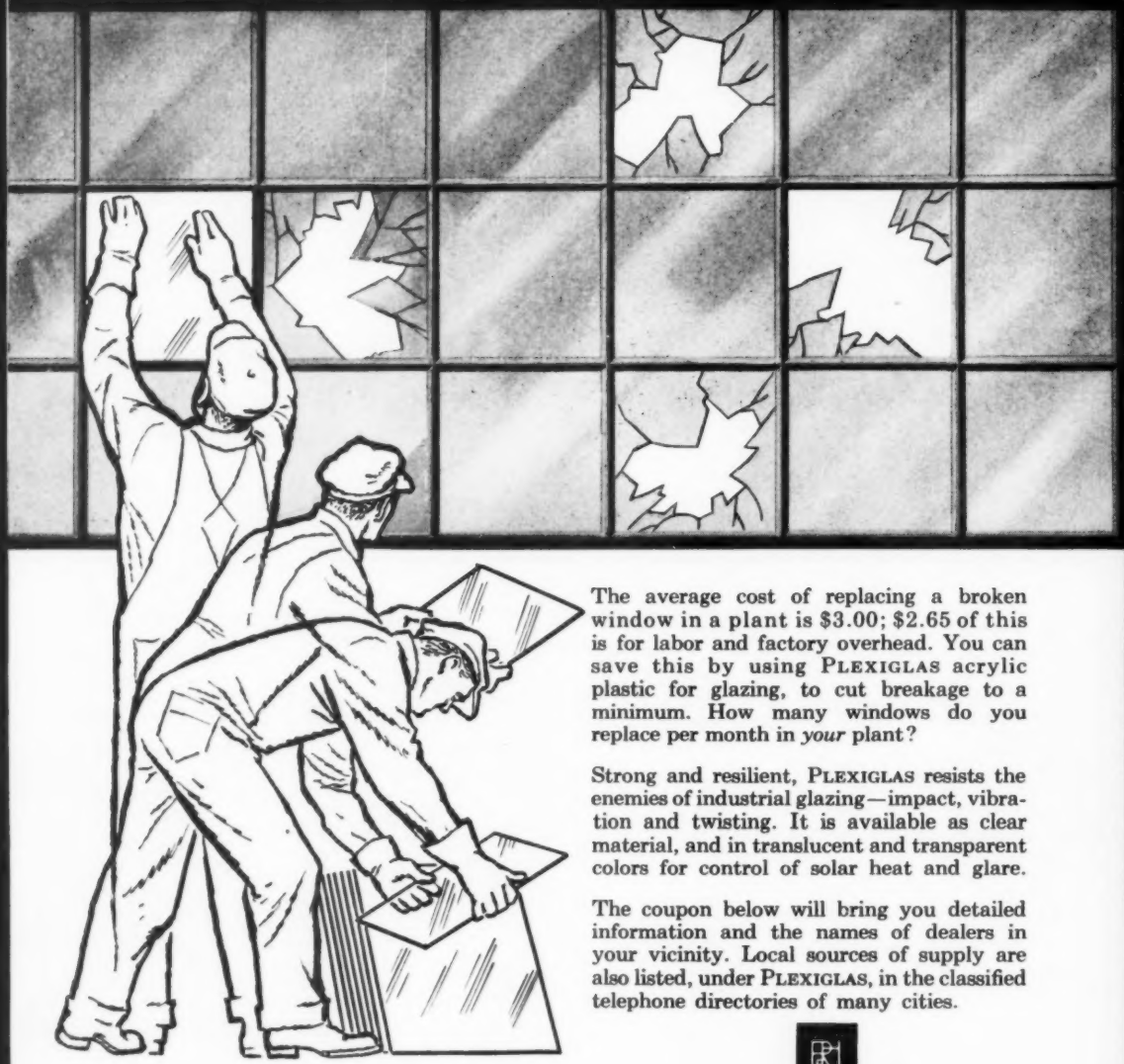
The Sign of *Quality* Motor Control



Allen-Bradley Starter in NEMA Type 7 Enclosure for hazardous gas locations. Cover removed to show the wide, machined flanges.

For more facts circle 577 on Reply Card

Most of the cost is labor — Save it with



The average cost of replacing a broken window in a plant is $3.00; $2.65 of this is for labor and factory overhead. You can save this by using PLEXIGLAS acrylic plastic for glazing, to cut breakage to a minimum. How many windows do you replace per month in *your* plant?

Strong and resilient, PLEXIGLAS resists the enemies of industrial glazing—impact, vibration and twisting. It is available as clear material, and in translucent and transparent colors for control of solar heat and glare.

The coupon below will bring you detailed information and the names of dealers in your vicinity. Local sources of supply are also listed, under PLEXIGLAS, in the classified telephone directories of many cities.

Rohm & Haas Company
Washington Square, Philadelphia 5, Pa.

Please send me:

☐ a copy of your brochure on glazing.

☐ the names of PLEXIGLAS dealers in this area.

Name.....

Company.....

Address.....

City.....Zone.....State.....

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

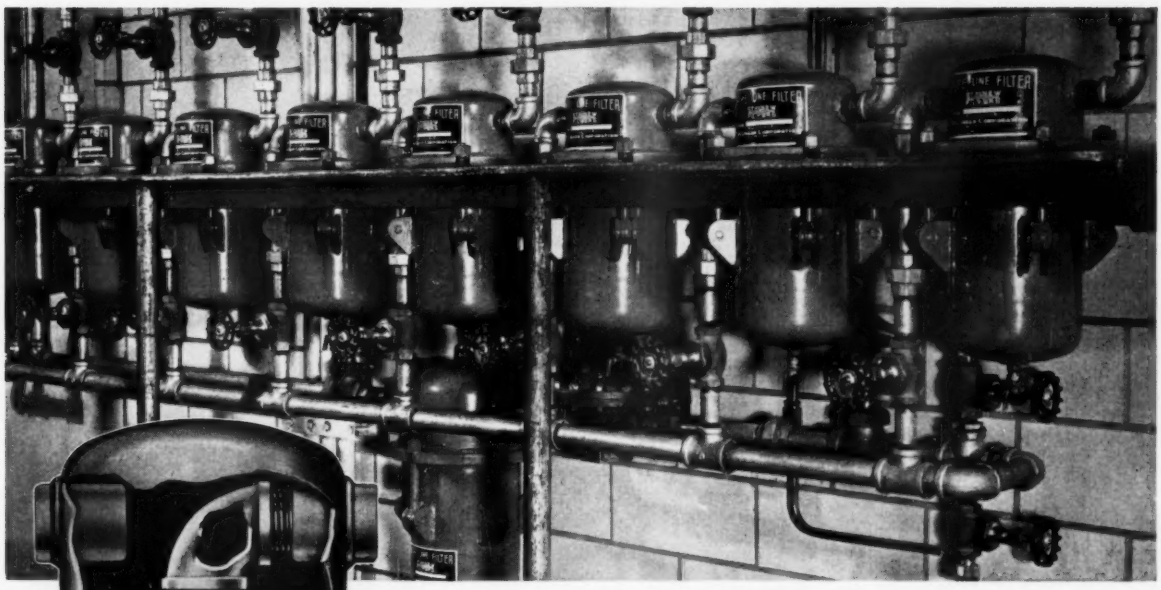
Representatives in principal foreign countries

PLEXIGLAS *is a trademark, Reg. U.S. Pat. Off. and in other principal countries in the Western Hemisphere.*

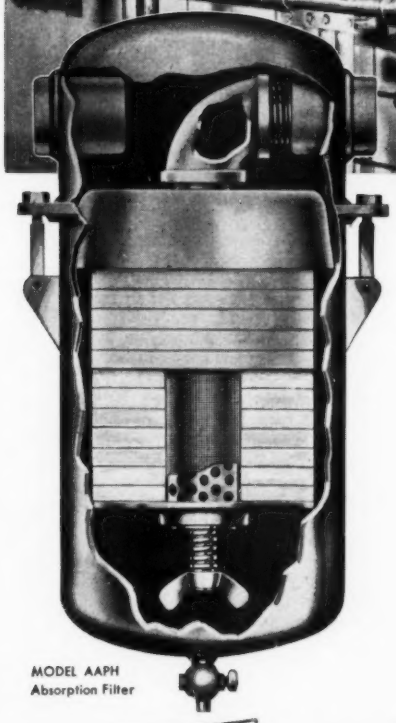
Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada.*

THESE STAYNEW ABSORPTION FILTERS

Protect Automatic Combustion Controls from All Oil, Moisture, Solids



Specially developed Staynew Filters guarantee clean, dry air for Boiler Controls at Rochester Gas & Electric Corp.



MODEL AAPH
Absorption Filter

The Rochester Gas & Electric's new automatic boiler controls needed *clean* air for efficient operation—air that's free of oil and moisture as well as solids. In order to accomplish this, coke and then charcoal filters were tried. An accumulation of oil continued to "gum up" the reducing valve feeding the master control. Our engineers were called in, and after thorough study, a special felt pad filter (shown at left) was developed and the new filters were installed. *Result*—no fouling has occurred in the control air system since the filters were installed in 1949.

If you have a special filtration problem call on Dollinger's experienced engineers. Write today for Bulletin B-1A.

Representatives in Principal Cities

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION

55 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

For more facts circle 613 on Reply Card

←—For more facts circle 606 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—LAMP BALLAST is lightweight and quiet

A fluorescent lamp ballast, lighter, smaller and quieter than manufacturer's previous models, features a "D" sound-rating according to company's standard for guidance of fluorescent lighting users. The improved rating is said to permit use of the ballast in locations with critical sound-level restrictions. A 14 per cent weight reduction in the new design provides savings in shipping costs, it is pointed out, and a reduction in mounting length allows greater freedom in fixture design. Designed for series operation of two 96T12 slimline fluorescent lamps at 425 ma, the new ballast is rated at 110-125 v, 60 cycles, with a line current of 1.55 amp. General Electric Co.

2—V-BELT DRIVE offers increased capacity, service

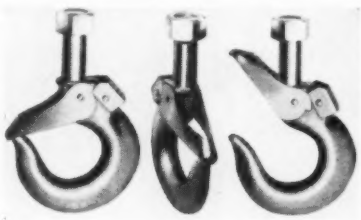
The belt, utilized in the Poly-V Drive is a single, endless rubber belt with a series of parallel V ribs molded lengthwise around the inside circumference; it has an uninterrupted high-strength member of synthetic cords across its entire width. The sheave grooves are designed to mate with the belt ribs, and since the belt covers the full width of the drive member (not an assembly of V-belts), the load is distributed equally.

It is explained that this provides twice the contact area of a comparable multiple V-belt application, so that the Poly-V Drive gives up to 50 per cent more horsepower with the same width, or equal horsepower with ⅓ less width. It is also noted that design features of the drive reduce face pressure on half, giving longer life to belt and sheaves, and the full drive width and total traction surface contact serve to prevent belt turnover and progressive sinking in sheave grooves.

An important feature of the new drive is that it affords marked economy in belt and sheave inventories. It is available in two cross sections: No. 187 for applications where A, B, or C section multiple V-belts would be used, and No. 375 for those where C, D and E sections would be used. These two sizes meet drive requirements from 3-in. pitch diameter sheaves and 50-in. belt pitch lengths upward. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

3—HOOK for hoists, has improved locking feature

Announced as offering greater safety to both men and equipment during lifting operations, this safety hook is also said to be so simple that the hoist operators will make full use of its safety locking



feature. Once the hook is engaged, a steel latch swings down and is held in place by a lock under spring tension. It is claimed that there can be no sideways movement of the latch, because it fits snugly over the point of the hook. Slight pressure on the release unlocks the latch and spring tension on the release holds the latch open.

The latch is designed to permit full and unobstructed use of the hook's large throat opening—and so that it will shed wires and other objects instead of snagging them. The hook itself is made of drop forged, heat-treated alloy steel and is said to have high tensile strength. It is an optional extra on company's new hoists, can be placed on those now in service. Coffing Hoist Co.

4—STORAGE BATTERY for electric industrial trucks

Announced as supplying more capacity relative to its size than any of company's previous nickel-iron-alkaline storage batteries, the new MC-Type is intended for use in electric trucks in which battery space is limited, especially those of the driver-ride sitdown type. The new battery affords a means of giving such trucks more capacity without changing steering wheel or pedal heights and without increasing length or width of battery boxes.

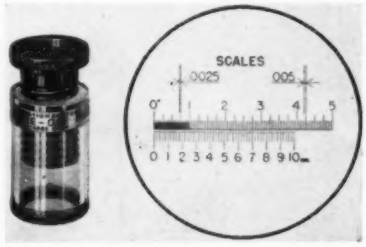
Cells of this new battery employ the steel-tube and pocket construction of plates utilized in company's other batteries, and are identical in electrical characteristics and ratings—they are rated at the 5-hr discharge rate, can be charged at full normal rate, and withstand various electrical "accidents" in the same manner. The cell is being produced in six sizes with capacities from 285 amp-hr to 710 amp-hr. Edison Storage Battery Div., Thomas A. Edison, Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 171-172.

5—POCKET COMPARATOR for finer measurements

The Pee Gee Pocket Comparator measures extremely small parts or minute dimensions on large parts through the use of a magnifying lens (about six power) and tiny transparent patterns called reticles. The latter are actually extreme reductions of large precise master layouts. The scales reticle, pictured with the comparator, comes in the instrument. It is used to measure dimensions from 0.0025 to 0.5 in. in steps of 0.0025, and 0 to 0.10 mm in steps of 0.2 mm.

Other reticles available for this optical measuring instrument are radii, angles, threads, thickness, diameters, and dimensions. The body of the comparator is



clear Lucite, and the adjustable lens barrel and reticle retainer are aluminum with a black anodized protective finish. Low in price, the Pee Gee is expected to replace more elaborate measuring devices for many tool room and production checking jobs. The comparator and scales reticle, in plastic container, cost less than $10.00. The six other reticles cost less than $5.00 for the set. National Tool Co.

6—PURIFIER keeps moisture and dirt out of air tools

Developed for keeping moisture and dirt out of air tools and other pneumatic equipment, the Type LC Hi-eF Purifier is said to require no maintenance. It has no filters; dirt and moisture are removed by a combination centrifugal and baffle-type separating element inside a forged steel body. Manufacturer of the unit says that once it's on the air line near the pneumatic equipment, there is no need for periodically cleaning it. Liquids and solids are drained off automatically by a float type trap.

This purifier is made with a stainless centrifugal separating element, and

2 New Services from Crane

How to Choose the Right Valve for Each Piping Job

HOW TO GET THESE FREE HELPS

Easiest way: phone your local Crane Representative—let him schedule a film showing for your group and supply the "take-home" handbooks. If more convenient, just drop a line to the address below.

Men responsible for specification, operation, and maintenance of industrial piping systems will get a real "refresher" from these new Crane customer services. Both film and handbook deal with the common problems of matching up valve characteristics and specific flow control needs for the most efficient result.

Following a review of basic valve types—gate, globe, angle, and check—variations in design of functional parts, and the effects on serviceability are discussed. All vital elements—disc and seating—disc-stem connection, bonnet joint, stem operation, etc., are covered. The motion picture stimulates high interest by developing a hypothetical case involving strong differences of opinion on valve selection. The manual—intended for distribution at film showings or for independent use—provides a lasting reference.

THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 148)

threaded inlet and outlet connections. It comes in a wide range of sizes for installation in any size piping when used in a vertical position, and in 1- through 2-in. sizes when installed horizontally. A ¾-in. size costs less than $14.00. The V. D. Anderson Co.

7—PATCHING COMPOUND for mending concrete floors

Kwik-Roc is a repair and patching compound said to mend holes and cracks in interior concrete floors quickly and permanently—and with almost no interruption of plant production or materials handling. Supplied in powder form, this

new material is simply mixed with water, poured into the cleaned out hole or crack, and leveled with the surrounding floor; normal traffic may be resumed within 45 min after pouring. According to manufacturer, Kwik-Roc has twice the compressive strength of many concretes used in floor construction. Kwik-Roc is not recommended for exterior surfaces, for floors that are constantly wet or subject to spillage of water or acids, or for the resurfacing of entire floor areas. A. C. Horn Div., Sun Chemical Corp.

8—COPYING MACHINE is low priced and portable

The Apeco Private-Eye Auto-Stat is intended especially for department-to-department use, or for individuals who require a photocopy machine that can be carried to the work source to make copies on the spot. It is light (weighs 24 lb) and compact and ready for operation when plugged into any electrical outlet. Manufacturer of the new machine says it's the lowest priced all electric, automatic, one-unit copier on the market.

It's designed for easy operation. In two steps a finished copy can be made by an inexperienced operator in less than 45 sec. Chemical trays and running water aren't needed—a plastic solution bottle allows for draining of the concentrate and storage so the operator's hands don't get wet. This copier handles letter and legal size copies as well as those up to 11-by-17 in. size, it is noted, and there are no limitations as to type of papers that can be copied, regardless of whether the original is printed on one or both sides, on opaque or translucent paper. The unit is available with zippered simulated leather carrying case. A booklet gives full information on this machine. American Photocopy Equipment Co.

9—FOLDING DOOR is "movable wall" between plant areas

Versatile in its functions is the Modernfold. When used between working areas and shipping room, this folding door helps prevent heat loss and maintain normal temperatures in the working area —without impeding traffic or obstructing materials handling equipment. It can be used to divide off two or more areas, and then folded back to the walls to consolidate an entire area when necessary, permitting subdivision and reapportionment of plant space. It is also a means of providing temporary enclosures where stationary partitions wouldn't be justified.

The Modernfold has a steel frame which can be covered in a variety of fabrics. For ordinary uses, vinyl coated cotton drill fabrics are suggested. They are washable, flame resistant and won't mildew, fade, crack or peel. For special uses, Modernfold can be obtained in a weather- and water-resistant duck fabric, or in fabrics to withstand corrosive fumes. New Castle Products, Inc.

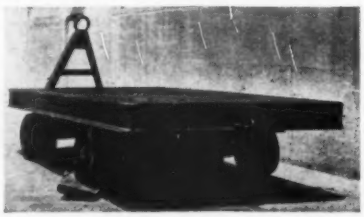
10—INSECT SPRAY is super strength pest killer

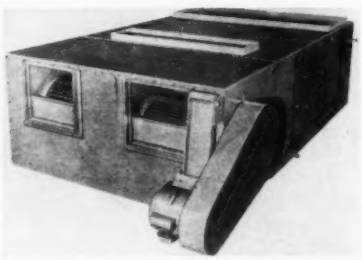
Camicide is announced as an odorless, super-strength insect spray that is safe for use around humans and pets, as well as food, woodwork and fabrics. It is suggested for keeping insect pests out of industrial plants, warehouses, cafeterias, locker rooms and rest rooms. It has three to eight times more insect-kill than many insecticides, says manufacturer, yet can be used safely.

Declared non-poisonous and non-irritating, Camicide has a base of piperonyl butoxide, bicycloheptene dicarboximide and pyrethrins. It's said to kill roaches, spiders, waterbugs, wasps, scorpions, silverfish, moths. Campbell Chemicals Inc.

11—HEAVY-DUTY TRAILER "walks over" the bumps

This 15-ton capacity trailer uses compensating rear axles to prevent load shifting over rough terrain. It is 60 in. wide, 120 in. long, and has a platform height of 22¾ in. It is fitted with a checkered steel deck, loop handle hitch and C type coupler on the rear. The wheels have pressed-on solid rubber tires, and Timken roller bearings are used to mount the four rear wheels on two compensating axles. Steering is by means of a fifth wheel turntable. Mercury Mfg. Co.





12—HEATING UNITS offer flexibility of installation

Heating-ventilating units in a newly announced line have capacities ranging from 1200 to 15,000 cfm, and can provide heating, ventilating, filtering, humidifying or any combination of these functions. Models are available for installation on floors, ceilings, or walls; and may have any of 10 heating coils—both non-freeze and standard steam and hot water.

It is emphasized that the sectional design of these Herman Nelson units, with rotatable fan sections, permit selection of just the components required for a specific job. Sections offered include the heating coil section, 1- to 3-centrifugal fan section, and humidifier. Casings are available for ceiling, wall or inverted installation, and floor models are offered with both open and closed bases. Motors and V-belt drives can be installed on either side of the units. American Air Filter Co., Inc.

13—INDUSTRIAL WIPERS of soft, non-woven fabric

Downy Soft Wipers are made of lightweight disposable, non-woven fabric. According to manufacturer, this material is

Miller HIGH PRESSURE HYDRAULIC CYLINDERS

HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

Standard Leather Cup Seal Assembly Shown Is Interchangeable With Miller Standard Piston Ring Piston Assembly

"Stock" Models for Immediate Delivery Added to Famous "Custom-Built" Line

Miller "Custom-Built" Cylinders are available on normal delivery in an *almost infinite selection.*

Identical-quality "Stock" Cylinders are available for *immediate delivery* in these popular sizes . . .

NON-CUSHIONED: 1½", 2½" and 4" bore sizes each available in 2", 4", 6", 8", and 11" strokes. CUSHIONED BOTH ENDS: 2", and 3¼" bore sizes each available in 3", 5", 7" 9", and 13" strokes.

"Stock" Cylinders are basic Model H53 with foot, flange and pivot mounting attachments available as desired.

NOTE: "Stock" Miller Air Cylinders also available!

Write For Complete Stock List

WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

MET J. I. C. HYDRAULIC STANDARDS years before their adoption in 1949.

SPACE-SAVING SQUARE DESIGN originated by Miller in 1945.

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

For more facts circle 585 on Reply Card

Miller

MILLER FLUID POWER CO.
(Formerly MILLER MOTOR COMPANY*)*

2011 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

NEW PRODUCTS

(Begins on page 148)

durable, highly absorbent, and lintless—strong enough to be rinsed and re-used, but inexpensive enough to be discarded when soiled. A feature of the product is that it is shipped in cartons of only 25 lb, loosely packed so it retains the downy soft finish. In quantity purchases, the wipers cost about 1 cent each for the 18-by-36 in. size, 2 cents each for the 36-by-36 in. size. The Leshner Corp.

14—FORK LIFT for stacking the palletized loads

A straddle-type Worklifter, the WL-F, is battery operated, has a hydraulic system of raising and lowering. Push-button controls are located at the end of a 12-ft. cord, held by a take-up cable, for operation from spot most convenient to the operator. Raising and lowering is at 34 fpm and the platform may be stopped in any position by releasing control button.

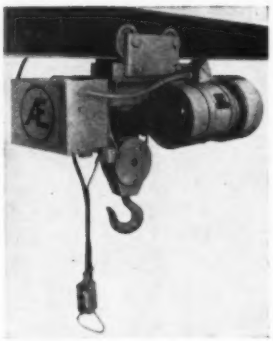
Power is from two 6-v 120-amp batteries connected in series to give 12-v service. Batteries may be charged when the WL-F is not in use by simply plugging cord into a 110-v a-c outside line. Rated at 750 lb, the unit is designed to take overloads up to 50 per cent. Two models are available with heights of 6 ft, 6 in., and 8 ft 2 in. and fork lifts of 58 in., 78 in. Economy Engineering Co.

15—ROOF VALVE helps fight fires in buildings

The Fire Valve, a roof unit for buildings, is designed to open quickly when excess interior heat occurs. Developed for fast release of heat, gases and smoke in the event of fire, each unit provides 46 sq ft of free area opening when two large dampers drop—released by a fusible link device. Dampers can also be opened and closed by a loop chain when it is desirable to use the unit for extra ventilation. The Fire Valve is weatherproof when closed, it is noted, and any number can be installed on a roof. The Swartwout Co.

16—ELECTRIC HOIST has a welded steel chassis

Made in popular 2-ton and 3-ton capacities, the Class BB Lo-Hed Electric Hoist is described as the most modern available. While retaining the balanced design basic in all of manufacturer's Lo-Hed line—

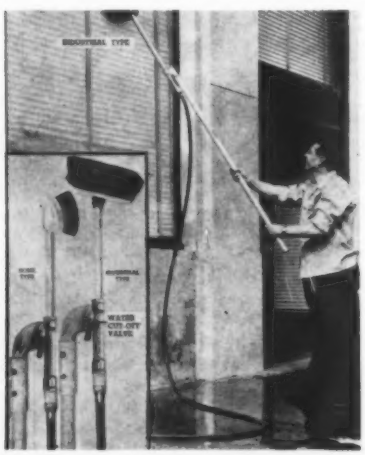


drum on one side, motor on the other—this new hoist incorporates recent developments in both engineering and materials.

In addition to its lightweight welded steel chassis, this new hoist has heat treated alloy steel, straight line 3-reduction spur gears; an automatic Weston heavy-duty lowering brake; heavy duty hoist and crane-type motor; other features. American Engineering Co.

17—PAINT is good-looking, rust-resistant finish

Superior rust resistance and a glossy enamel-like beauty are claimed for Nev-A-Rust. Its formula blends alkyd resins with rust inhibitive pigments and linseed oil. This paint may be applied by brush or reduced (eight to one) with mineral spirits for spraying. Manufacturer says it dries in 6 to 8 hr, and may be recoated in 24 hr. The new paint is announced as a particularly valuable protective finish against corrosive action of fumes and gases. Although formulated especially for coatings on structural steel, Nev-A-Rust offers protection to any metal surface subjected to oxidation and corrosion. It is said to be unaffected by temperature extremes. The Glidden Co.



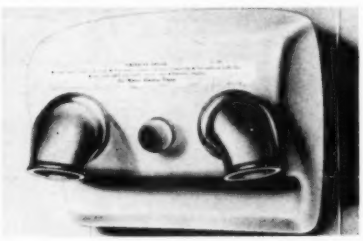
18—BRUSH lets window washing be "ground" work

Window washing is an easier, safer job with the Waterflow Brush, because it lets a man stand on the ground while he's working—even with windows as high as 90 ft up. The brush is used with lightweight aluminum poles furnished in 5-ft sections, which can be assembled for the desired length. You insert one pole into the expanded end of another, and secure it with two bolts. The brushes are designed for attaching to a hose, and can also be used to clean wood, metal, brick and cement surfaces. The industrial model of the Waterflow Brush costs around $20.00 and the aluminum poles around $4.50 per section. (There's also a smaller model for a plant engineer's home window washing chores.) J. B. Sebrell Corp.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 171-172. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

19—ELECTRIC DRYER dries two pairs of hands

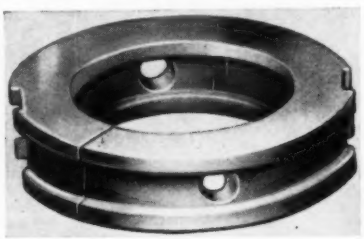
Two can dry as fast as one, and at the same time, with the Model DA-20 Dryer the "Thrifty Siamese Twins." Housed in a white and chrome cabinet, the dual-nozzle unit mounts on the wall in a space of 13 by 11½ in. A timing device shuts it off automatically at the end of a 40-sec cycle, although hands are dry in about 18 sec. Both nozzles revolve on a 360-deg cycle allowing for face, underarm and body drying. Case histories are reported to show maintenance savings of up to 98



per cent with this dual-nozzle dryer. Like company's single-nozzle models, this dryer has a built-in deodorizing system. The unit can be installed on a 115 or 220 v circuit. Descriptive literature is offered. American Dryer Corp.

20—SEAL CAGE is one-piece flexible sealing unit

The Chempro Teflon Seal Cage is a one-piece flexible unit for use with stuffing boxes on pumps, mixers, reactors and other processing equipment. It is claimed to be longer lasting than two-piece metal



lantern rings, and to allow easy snapping over the shaft without dismantling pump or pulling the shaft. Manufacturer says this seal cage will not score the shaft during operation even at high speeds, and is designed not to bend or collapse under extreme gland pressure. These seal cages are available in standard or special sizes for pumps, mixers, agitators. Chemical & Power Products, Inc.

(More New Products on page 158)

HOW'S THIS FOR AN OVERHEAD WELD?

. . . You can make mild steel welds like this in <u>any</u> position

with the improved AIRCO® 78E electrode

Above is an unretouched photograph of a butt weld made in the overhead position with the improved AIRCO 78E electrode, AWS Class E-6010. The joined sections are 3/8″ SAE 1020 steel plate, welded with 5/32″ electrodes at 130 amperes, D C reversed polarity.

A smooth-looking weld, yes, but appearance is only part of the story with the AIRCO 78E electrode.

Field testing in all welding categories covered by AWS Class E-6010 specifications has shown that the improved 78E consistently outperforms other electrodes of its type in weld quality, speed and ease of handling.

The 78E's improved flux coat gives you higher current capacity and faster burn-off rate . . . without "fingernailing" or slag and gas inclusions in the weld metal. Result: in all positions, weld quality is every bit as good as its smooth outward appearance would lead you to hope.

If you haven't yet had a chance to give the new AIRCO 78E a trial, get in touch with your Airco office or dealer today. Here's another suggestion: – ask for a copy of Catalog 10, "Pocket Guide to Airco Electrodes."

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

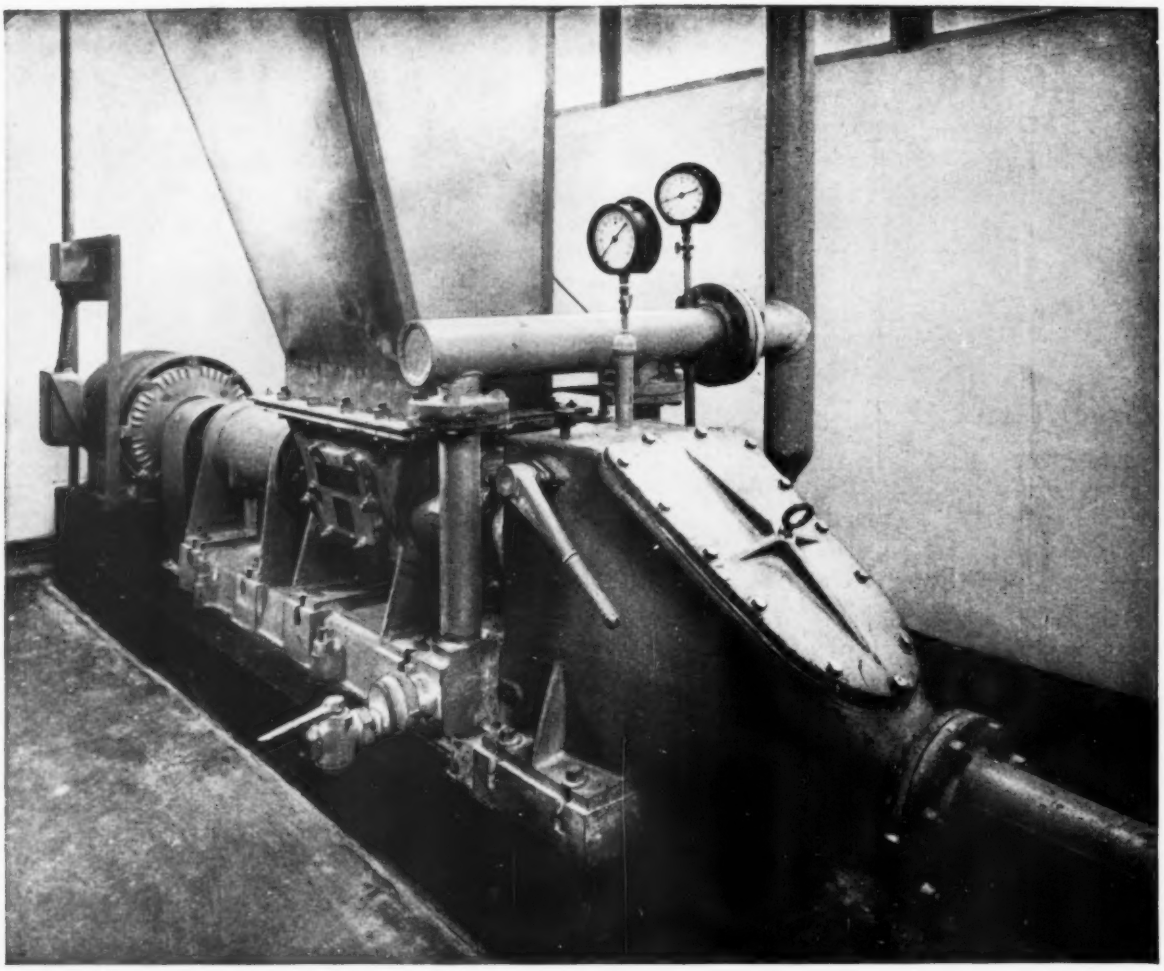
Divisions of Air Reduction Company, Incorporated with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Magnolia Company
Air Reduction Pacific Company
Internationally by Airco Company International

at the frontiers of progress you'll find

AN AIR REDUCTION PRODUCT

For more facts circle 586 on Reply Card



speeds handling of flash-dried starch with FULLER-KINYON

In Hammond, Indiana, the unique, new starch processing operation of American Maize-Products Co., uses the Fuller-Kinyon Conveying System to *float* the final product to bagging departments.

Careful engineering presaged the introduction of this method, new in starch processing. And the same creative engineering found the Fuller-Kinyon System the best solution to quick, economical and sanitary conveying of the dried starch product.

After flash-dried starch is processed to a 12 per cent moisture content, it is conveyed by a Fuller-Kinyon Pump to either dextrine or starch bagging departments. This includes travel through 600 ft. of piping at a rate of 12,500 lb. per hr. Push-button control is used to direct the product stream to the desired point of delivery.

Air conveying of dry, pulverized materials has had specialized engineering treatment at Fuller for twenty-six years. This experience is available to you, without charge, for the examination and installation of Fuller air conveying systems, to save you money. Write today for complete information.

Fuller
CONVEYS BY AIR
CLEAN...FAST...EFFICIENT

FULLER COMPANY, Catasauqua, Pa.
120 S. LaSalle St., Chicago 3—420 Chancery Bldg., San Francisco 4

P-142—1818

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS AND ASSOCIATED EQUIPMENT

For more facts circle 587 on Reply Card

For more facts circle 588 on Reply Card

FIRE SAFETY *is our business, too!*

Dependable CLARK Fire Pump Motor Starters are on guard in thousands of buildings to help prevent disaster like that above. We have been in this business for nearly half a century and have been pioneers in the field.

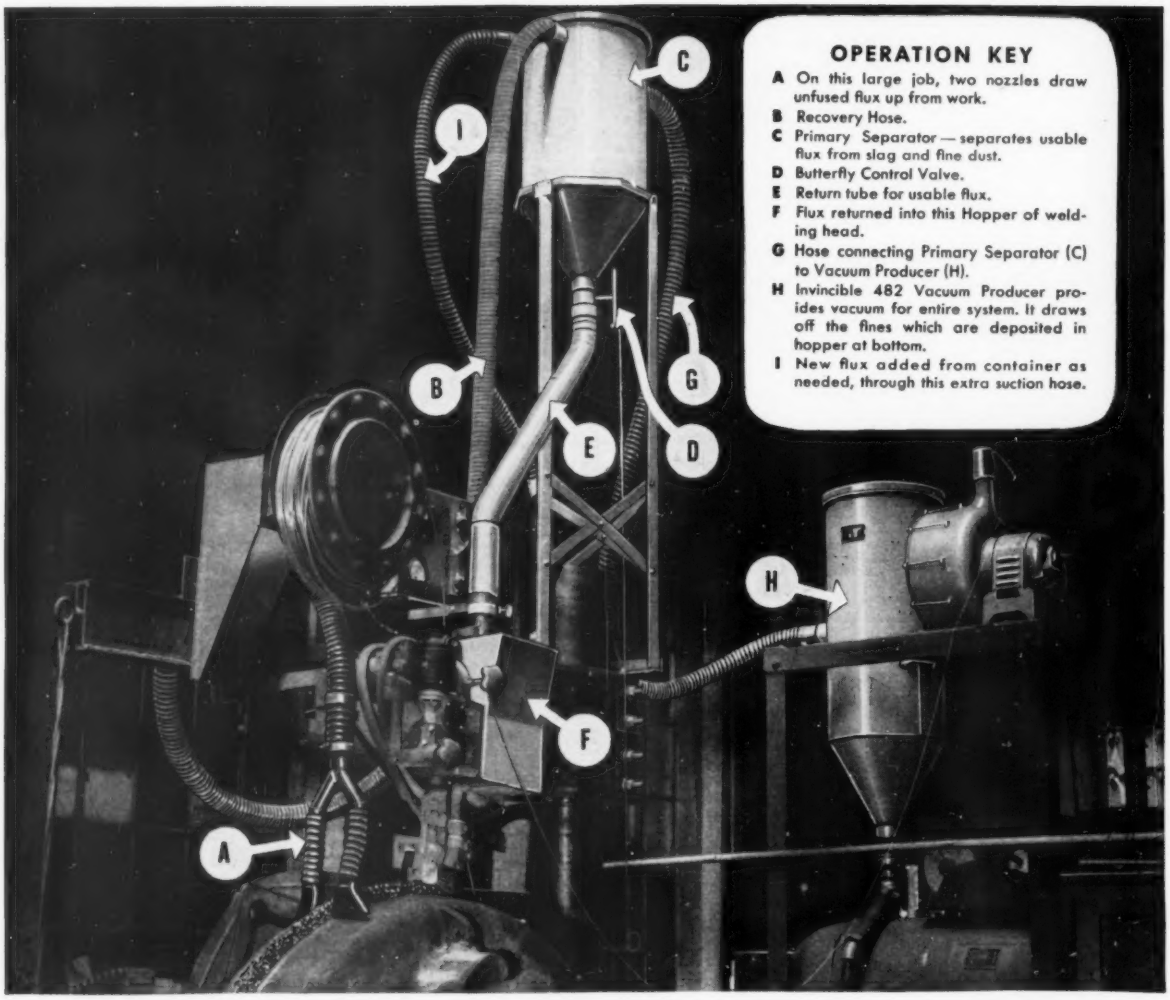
CLARK Fire Pump Controls are available in non-automatic and combined automatic—non-automatic types. They are approved by Underwriters' Laboratories, Factory Mutual Association and conform to National Fire Protection Association standards. Because of this approval, CLARK Fire Pump Controllers on your systems earn the lowest possible insurance rates.

Engineering service and descriptive literature is available.

The **CLARK CONTROLLER** *Co.*

ENGINEERED ELECTRICAL CONTROL

1146 EAST 152nd STREET, CLEVELAND 10, OHIO



OPERATION KEY

- **A** On this large job, two nozzles draw unfused flux up from work.
- **B** Recovery Hose.
- **C** Primary Separator — separates usable flux from slag and fine dust.
- **D** Butterfly Control Valve.
- **E** Return tube for usable flux.
- **F** Flux returned into this Hopper of welding head.
- **G** Hose connecting Primary Separator (C) to Vacuum Producer (H).
- **H** Invincible 482 Vacuum Producer provides vacuum for entire system. It draws off the fines which are deposited in hopper at bottom.
- **I** New flux added from container as needed, through this extra suction hose.

INVINCIBLE Flux Recovery Unit Saves Labor, Quickly Pays for Itself

This Invincible continuous flow system was installed by a manufacturer of circular lifting magnets to recover flux during a large automatic welding job. Previously, the excess flux was manually collected and screened. Now this Invincible system does the entire job automatically (see key to operation picture). By thus saving one man's labor, the installation is expected to pay for itself in three months. Invincible supplies both manually operated and completely automatic Flux Recovery Systems. Scores of installations are saving labor, salvaging valuable material and improving production efficiency. *Without obligation an Invincible engineer will advise you about your flux recovery problem in automatic welding.*

INVINCIBLE VACUUM CLEANER MFG. CO.

DOVER, OHIO

OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

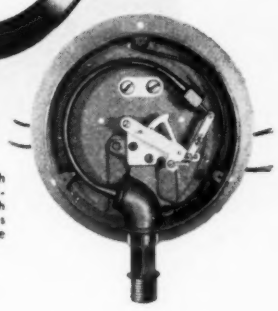
For more facts circle 589 on Reply Card

PRESSURE SWITCHES

• What they are • How they work • Where you use them

TYPE VI

TYPE V



Front of Type VI Pressure Switch with ring, dial, and pointer removed. The back of the VI with cover removed is the same as the V Pressure Switch opposite with cover removed.

Type V Pressure Switch with cover removed.

The USG Type V Pressure Switch consists essentially of a pair of micro-switches making or breaking contact in response to a pressure-sensitive element (bourdon spring).

Type VI has the same switch-operating pressure element as Type V but it has an additional bourdon spring connected to a pointer so that pressure can be read on a dial.

Pressure switches are used wherever a pressure warning signal must be given. Typical applications are: hydraulic pumps, hydraulic presses, die casting equipment, or guarding or controlling high or low tank pressures.

For information relating to your problem, call the United States Gauge office in your city or get in touch with us at Sellersville. United States Gauge, Division of American Machine and Metals, Inc., Sellersville, Pa.

CONSTRUCTION

TYPE V	**Case:**	Cast-iron case, back flange mounting, black crackle finish.
	Size:	4½" case only
	Bourdon Tube:	Beryllium copper or stainless steel
	Pressure Connection:	Lower only: ¼" male N.P.T. up to 1000 lbs. pressure; ½" male N.P.T. for 1000 lbs. and over.
	Electrical Connection:	½" female pipe conduit.
	Pressure Ranges:	Up to 10,000 p.s.i., vacuum to 30".
	Micro-switches:	High and low; rated 10 amps., 110 A.C., both fully adjustable over entire range of gauge.
	Switching Differential:	3%. Switches are not affected by overpressure.
TYPE VI		Same case construction, micro-switches, switch-operating elements, switching differential, pressure connections, electrical connections, and pressure ranges as Type V.
		Case has dividing wall between the separate bourdon spring systems for operating the pointer and the micro-switches.
	Dial Sizes:	4½" and 6"
	Accuracy of Indications:	½ of 1% of the scale range.

Quality Gauges Engineered for Enduring Accuracy UNITED STATES GAUGE

PRODUCTS OF UNITED STATES GAUGE... Absolute Pressure Gauges • Aircraft Instruments • Air Volume Controls • Altitude Gauges • Boiler Gauges Chemical Gauges • Mercury, Gas, and Vapor Dial Thermometers • Glass Tube and Industrial Thermometers • Flow Meters • Inspectors' Test Gauges Precision Laboratory Test Gauges • Marine, Ship and Air-Brake Gauges • Voltmeters • Ammeters • Welding Gauges.
OTHER DIVISIONS OF AMERICAN MACHINE AND METALS, INC. AT SELLERSVILLE, PA.: GOTHAM INSTRUMENTS, AND AUTOBAR SYSTEMS

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NOW!
a new color for Gaco N-700 Neoprene Maintenance Coating

Available for the first time in

ALUMINUM*

N-700 Neoprene Maintenance Coating

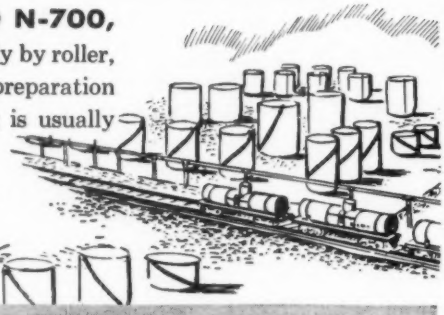
GACO NEOPRENE PROTECTION PLUS—GACO N-700, Aluminum, gives all the performance-proven corrosion protection found in GACO N-700, Gray and Slate Black, *PLUS* the advantages of the aluminum color—light and heat reflection and beauty.

TIME TESTED—GACO N-700, Aluminum, has been field tested for over 100 weeks in severe corrosive fume conditions, and passed with flying colors. It retained its beauty, brilliance and corrosion protection qualities.

REFLECTS LIGHT & HEAT—GACO N-700, Aluminum, adds the light and heat reflecting qualities of aluminum to the long-lasting corrosion protection of genuine GACO Liquid Neoprene.

EASY TO APPLY—GACO N-700, Aluminum, is easy to apply by roller, brush or spray. Surface preparation is simple—wire brushing is usually all that is necessary.

*Not recommended for service in presence of acid halides.



Send me complete practical and technical data on this genuine Neoprene Maintenance Coating that goes on like paint at lower applied cost. P

NAME_____

COMPANY_____

ADDRESS_____

Send this coupon to:

GATES ENGINEERING COMPANY 100 S. West St., Wilmington, Delaware

The pioneer maker of Neoprene coatings and linings

For more facts circle 591 on Reply Card

NEW PRODUCTS

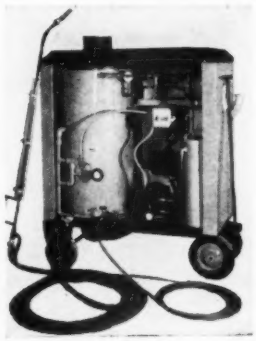
(Begins on page 148)

21—FREON CONDENSERS are available in two styles

A new line of extended surface Freon condensers is offered in two styles of units. The Model CFG Shell and Coil Condensers are designed to fill the need for a low cost condenser in small tonnage installations. Manufacturer says this UL approved condenser may be had from stock in 2-3-5-7½- and 10 ton sizes. The Model CRF Condenser is a straight tube unit with removable heads, available in 2- through 25-ton sizes. Both models are announced as ASME constructed and stamped. Catalog and selection data are offered. Bell & Gossett Co.

22—STEAM CLEANER is oil-fired automatic unit

Model QSI is a portable oil-fired steam cleaner. Automatic in operation, its only controls are two electric switches to stop and start the cleaner. Increased cleaning



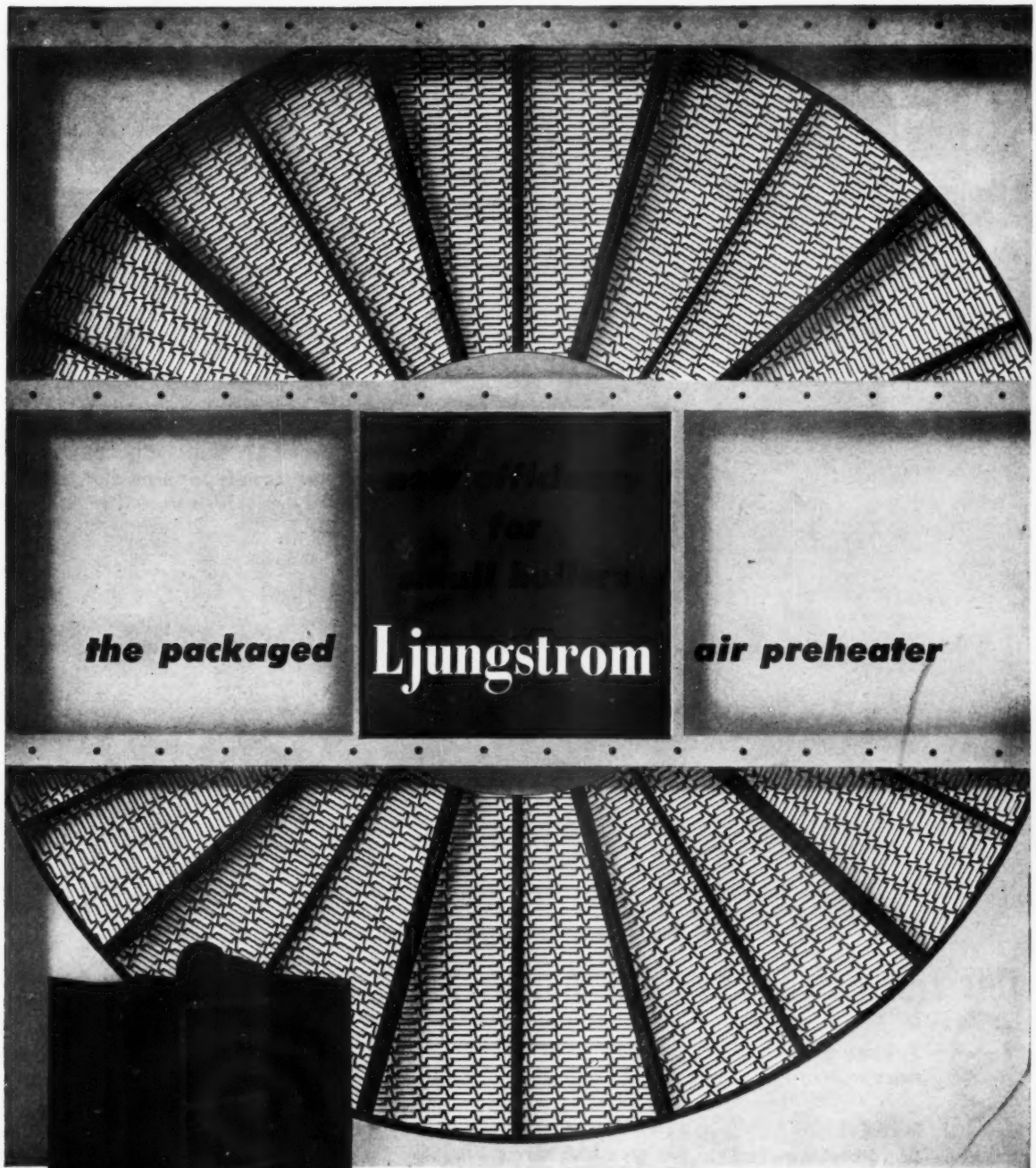
power of 120 lb pressure and 120 gal per hour is featured. Other models have higher capacities. Quick Charge, Inc.

23—SMALL TRANSFORMER for meters, instruments

The JCA-O is a new butyl-molded miniature current transformer featuring both window-type and bar-primary construction. It is designed for operating meters and instruments and can be used on either single-phase two-wire or polyphase circuits. It is rated at 600-v and is suitable for use on circuits of 600-v or below. The window-type unit is suggested for

operation over a bar-primary conductor on circuits up to its rated voltage. Two current ratings are available in both models—200.5 and 400.5 amp.

The new device is designed to carry its

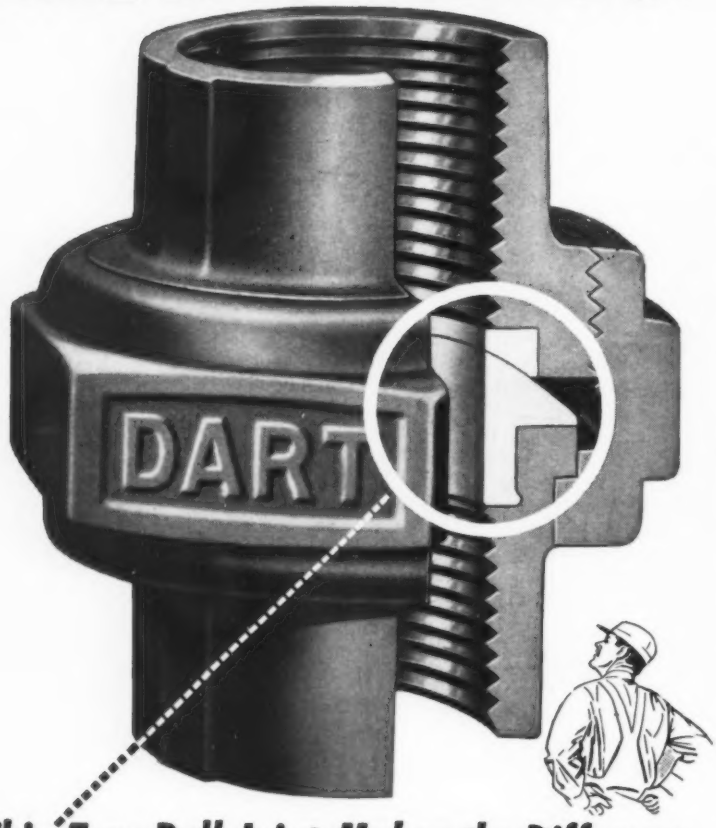


Even boilers as small as 25,000 pounds of steam per hour — can now operate at fuel efficiencies you never dreamed of. With the new *Packaged Ljungstrom*, you can apply the principles of heat recovery universally used in large utilities. The Packaged Ljungstrom Air Preheater operates on the *continuous regenerative counterflow* principle. Waste heat in products of combustion is absorbed on specially designed surfaces in the slowly rotating rotor. As the surfaces enter the stream of incoming combustion air, they transfer their heat to this air. The entire unit is self-contained as you receive it. For more detailed information – get in touch today with The Air Preheater Corporation.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

For more facts circle 592 on Reply Card

Dart Unions are LEAKPROOF



This True Ball Joint Makes the Difference

You can't buy an *easier*-operating, *longer*-operating, more *positive*-operating union for *any* money

QUICK FACTS

- Leakproof because precision-machined to a true ball joint and spherically ground
- Extra wide bronze seats (Resist pitting and corrosion)
- Heavy shoulders (Take severe wrenching without harm)
- Nut and Body Practically Indestructible (They're air-refined, high test malleable iron)

See your supplier today

DART UNIONS

DART UNION COMPANY • PROVIDENCE 5, RHODE ISLAND

The Fairbanks Co. — Distributors: Boston • New York • Pittsburgh • Rome, Ga.

For more facts circle 593 on Reply Card

NEW PRODUCTS

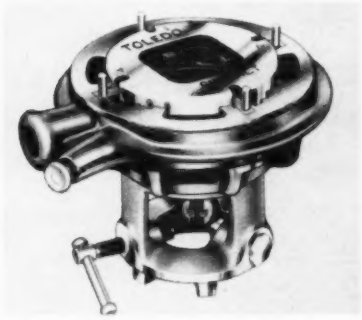
(Begins on page 148)

rated current continuously with a 55 C ambient temperature without overheating. With a 30 C ambient temperature it will carry 200 per cent rated current without exceeding the allowable 55 C rise, company engineers point out. According to them, the molded butyl serves as insulation and support and casing. It provides high dielectric strength, heat dissipating properties and resiliency and resists oxidation, arc-tracking and moisture.

The JCA-O can be mounted in almost any position, indoors or outdoors, and is declared especially suitable for use in small boxes. Both models can be equipped with an auxiliary mounting plate. General Electric Co.

24—RATCHET THREADER has cam-type pipe holder

This company's Simpact 1 in. to 2 in. self-contained ratchet threader is now offered with an improved cam-type quick-action pipe holder. This holder is designed with broader jaws to permit more positive grip on the pipe, and free action cam that sets instantly to size. Quick setting of high speed steel dies can be made to four pipe sizes, 1 in. to 2 in. You simply push the size selector button, slip dies in proper steps, turn head slightly and the die size is changed. Simplicity of design has reduced moving parts in this tool; it is lightweight and compact—will thread a pipe projecting through a wall as short as 6¼ in. The Toledo Pipe Threading Machine Co.

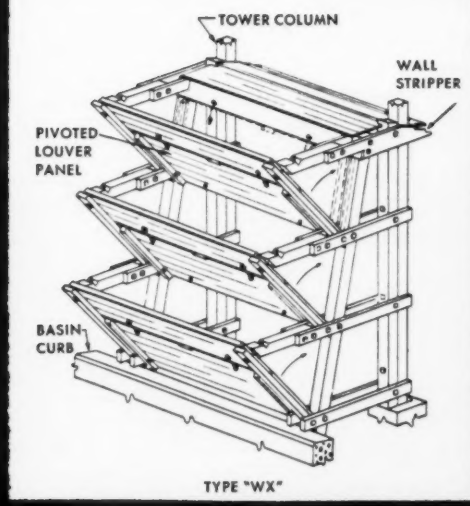


25—ELECTRICAL RECORDER is small, direct writing

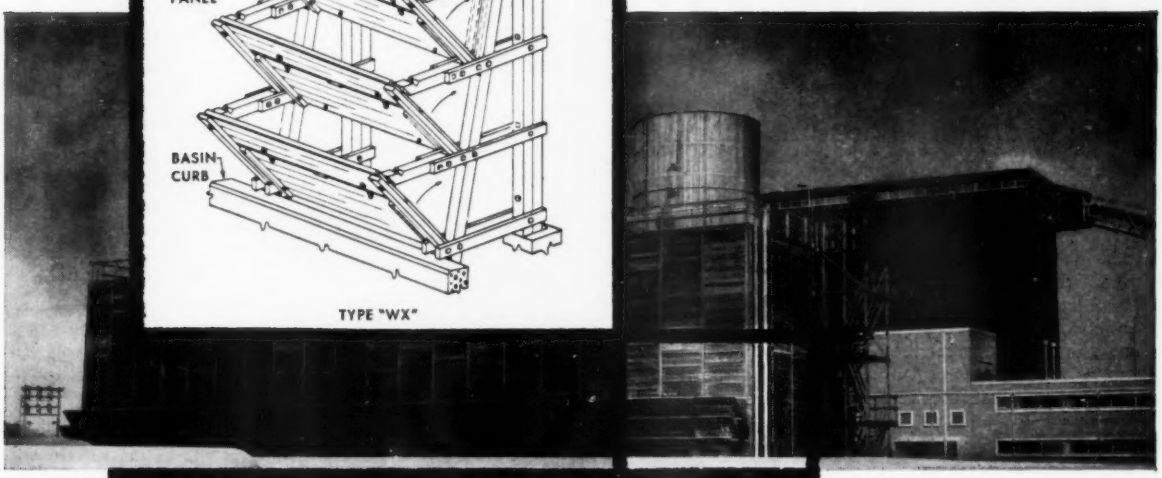
This miniature recorder for voltage and current records, in both a-c and d-c models, weighs only 7½ lb. With the self-shielded instrument mechanism incorporated, its field of usefulness includes recording ampere-hour demand in power company surveys; checking reports of low voltage, overloads, or unbalanced conditions; recording current and duration in electroplating and metal refining; recording speed, battery life tests.

For d-c measurement, Model 6401 comes in ranges of 1 ma to 5 amp, and in voltage ranges from 100 mv to 300 v, self-contained. Higher ranges can be obtained through accessory shunts or multi-

NO ICE NEXT WINTER



TYPE "WX"



Winter icing won't trouble the efficient operation of this power plant cooling tower at the Tuscola plant of National Petro-Chemicals Corporation.

The unique design of Pritchard's TYPE "WX" louvers prevents trouble before it can start. Each pivoted panel may be closed independently to eliminate ice build-up. And the louver installation is angled so the bottom panels are farther from the greatest splash area, again minimizing the chance for ice formation.

This efficient design detail is just another example of the superiority of Pritchard cooling towers — used to solve cooling problems in hundreds of industrial and power installations throughout the country. You can solve your cooling problems the same, easy way. Simply contact Pritchard.

Industry's Partner for Progress

J. F. Pritchard Co.
OF CALIFORNIA
A DIVISION OF J. F. PRITCHARD & CO.
Dept. 412, 210 West 10th Street
Kansas City 5, Mo.

Representatives in Principal Cities From Coast to Coast

COOLING TOWERS
AIR COOLED HEAT EXCHANGERS
GAS & AIR TREATING EQUIPMENT

For more facts circle 594 on Reply Card

SPLASHED WITH OIL . . .

ALGRIP

still remains Non-Slip!

It occurs every day. ALGRIP Abrasive Rolled Steel Floor Plate is installed—then insurance premiums tumble—slipping accidents stop.

The reason is tough steel floor plate *impregnated uniformly* with abrasive "grinding wheel" grain. Result: A truly non-skid surface that *stays* slip-proof, because wear only exposes new particles . . . a "safety extra" offered only by ALGRIP.

If your accident insurance premiums are too high, let ALGRIP bring them down. Mail this coupon today for the complete ALGRIP story. There's no cost or obligation.

Underwriters' Laboratories approved for safety. Note depth and uniformity of abrasive grain.

A.W. ALGRIP Abrasive Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

Please send Booklet AL-5 on how ALGRIP can cut costs and accidents:

NAME_____ TITLE_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

For more facts circle 595 on Reply Card

NEW PRODUCTS

(Begins on page 148)

pliers. For a-c measurement, the rectifier type, Model 6402, is available in current ranges to 5 amp, self-contained, and in voltage ranges to 300 v, self-contained. Higher voltage ranges can be obtained through external multipliers; higher current ranges with a Model 604 Type 1 current transformer. Weston Electrical Instrument Corp.

26—PLASTIC SLIDE RULE is compact, circular type

According to manufacturer, this 8-in. diam circular slide rule is equivalent to a straight-type slide rule over 20-in. long, and it's low priced. It performs the functions of multiplication, division, proportions, finding squares or square roots, cubes or cube roots, reciprocals and logarithms. Instructions for use are printed on the reverse side.

Of laminated Vinylite, the rule is printed on sliding discs of 7½- and 8-in. diam, with fine graduations impressed in blue and black and protected by clear over-lamination. It costs around $3.00. Allegheny Plastics, Inc.

27—PAINT is formulated to stay on wet walls

Wet Wall Paint is claimed to solve the maintenance problems of walls constantly wet with condensation or steam. It bonds securely even when applied to a wet wall, says company, and forms a hard enamel surface that is easily cleaned—peeling of the paint and rotting of the surface beneath it are prevented by the porosity of

the paint. Manufacturer says it is called the "paint that breathes" because it lets atmospheric moisture pass through the painted surface without destroying the paint bond. And surface moisture rims off the hard finish, so that the wood is double protected.

Tests of Wet Wall Paint are reported to show that it stands the temperature "lows" of freezers and "highs" of hospitals. It comes in white, but can be tinted with standard colors-in-oil, and can be applied with brush or spray. Manufacturer says it costs no more than a good enamel. George Kirby Jr. Paint Co.

(More New Products on page 173)

NEW "Small" boiler is a Big Quality package!

Available up to 80 hp — heating or processing — steam or hot water. A complete unit from a single source.

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NO BOILER HAS EVER OFFERED SO MANY ADVANTAGES AND QUALITY FEATURES AT SUCH LOW INITIAL COST

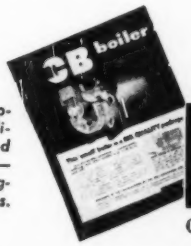
• This NEW CB boiler has EVERYTHING needed to bring *big boiler standards* to commercial, industrial and institutional users with small capacity requirements. Despite its unusual, compact size you get big boiler performance — from matched-quality components, proved the world over on thousands of Cleaver-Brooks self-contained units.

Get all the facts NOW on how the new CB can help you save dollars. Make it a point to see . . . and *hear* the most silent-running, biggest boiler value available anywhere!

gives you all the quality features of time-tested self-contained design

- **FOUR-PASS FIRETUBE CONSTRUCTION** — longer gas travel scrubs heat from flame — means lower fuel costs — guaranteed efficiency of 80% when firing with oil.
- **SILENT OPERATION** — even at peak load this boiler more than meets the low sound levels required for schools, hospitals, institutions.
- **FULL FIVE SQUARE FEET** — of heating surface per boiler hp — for longer service life and low maintenance.
- **FUEL FLEXIBILITY** — burns available light oil, gas, or combination oil/gas — simple, quick fuel changeover on oil/gas models.
- **FAST, EASY MAINTENANCE** — front and rear doors hinged for fast inspection, cleaning or servicing boiler.
- **AUTOMATIC SAFE OPERATION** — all controls centralized and conveniently located — modern electronic combustion control is standard equipment.
- **COOLER BOILER ROOM** — fiber glass blanket insulation and 16 gauge metal sectional lagging are non-corrosive, moisture and heat resistant.
- **FULLY APPROVED** — by Underwriter Laboratories; conforms to ASME codes; factory tested before shipment.

Call your nearest CB boiler representative (see your phone directory) or send for this illustrated catalog describing the NEW CB — designed by Cleaver-Brooks, originators of self-contained boilers.

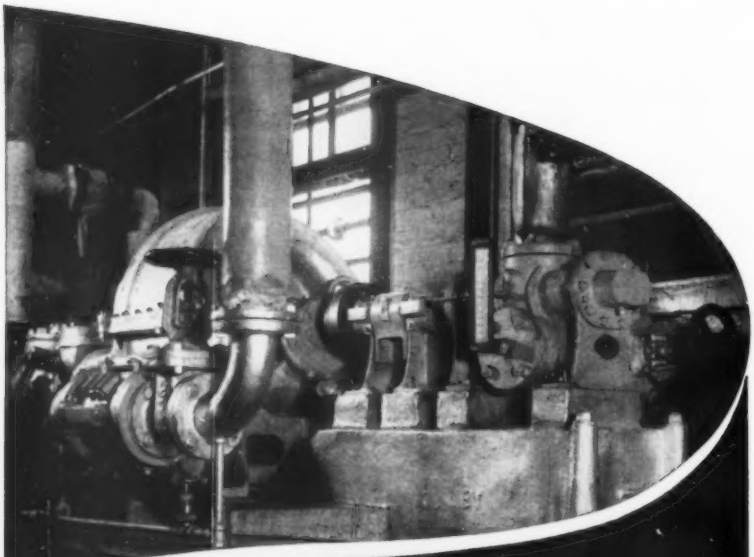


Cleaver Brooks

Cleaver-Brooks Company, Dept. H, 306 E. Keefe Ave., Milwaukee 12, Wisconsin, U.S.A.
Cable Address: CLEBRO — Milwaukee — All Codes.

Originators of the Self-Contained Boiler

For more facts circle 596 on Reply Card



THIS

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SCREW PUMP

"became of age" in 1950

at American Cyanamid Warner's Plant

Linden, N. J.

Also, it has a twin brother there too, both installed in 1929 and *no repairs on either up to 1951.*

These turbine driven No. 3¼ Warren-Quimby Screw Pumps supply Bunker "C" Fuel Oil at 90°F. to the burners in the Linden Power Plant, which generates steam for power and processing. They are driven by 25 hp 1300—1495 r.p.m. non-condensing turbines; capacity 58 g.p.m. at 1300 r.p.m. against discharge pressure of 250 psig, with suction lift of 8 feet.

POWER PLANT OR PROCESSING, SPECIFY: WARREN QUIMBY PUMPS

G-2

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.

Warren, Massachusetts

For more facts circle 597 on Reply Card

Mechanical Rectifiers

(Continued from page 89)

Figure 5 shows top view of contacts with cover removed. Altogether there are six contacts. The pencil (arrow) indicates the point between which voltage drop is being taken. To provide proper operation of the rectifier, this drop must be kept at certain specified volume slightly over 2 v.

Figure 6 shows connection between individual contact and the ground. The mechanic can make necessary adjustment to contacts, by means of a screwdriver and special screw which adjusts contacts on each phase. He also checks reading of voltmeter.

Figure 7 shows removal of the contacts chamber in order to inspect condition of contacts.

Figure 8 shows three contacts being exposed with the covers removed. Surfaces of contacts should be examined for possible defects which can result in improper operation. If the surfaces of contacts are badly worn or burned they should be replaced.

Figure 9 shows the parts which require most of the attention in maintenance. They are the gaskets used to prevent oil from getting into the contact mechanism.

The oscilloscope, Fig. 10, is used for exact timing of the rectifier. Certain determining shape of wave must be kept to assure trouble-free operation.

Figure 11 shows inspection of the contacts inside the rectifier. The protective covers are removed and each contact is very carefully examined. Figure 12 shows examination of contacts on a-c supply.

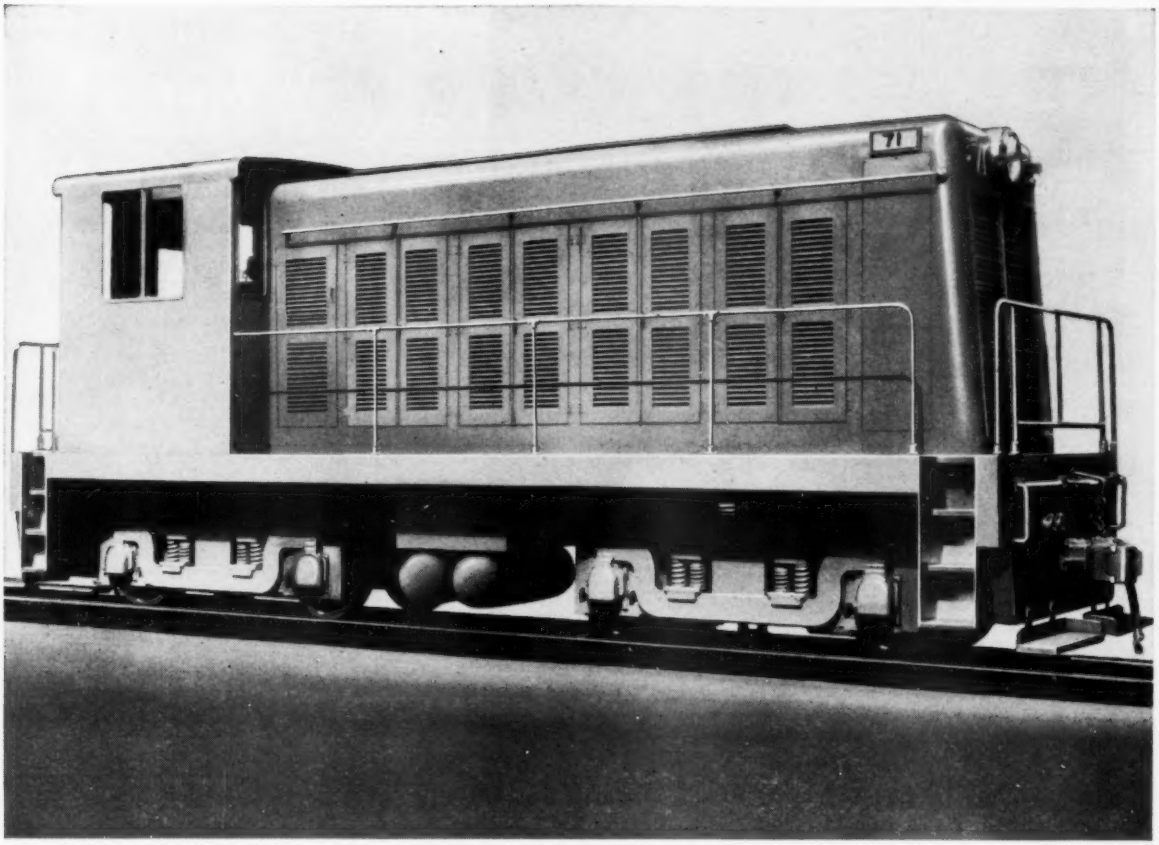
Modernization at Alco

(Continued from page 101)

utilized for removing assembled tank hulls from conveyor dollies and placing them on a second conveyor line for further assembly operations. They are also used to return the empty conveyor dollies to the start of the conveyor line.

As a plant security measure, in areas lacking security-type fences, and where such fences could not be installed, doors had to be safeguarded so that even blueprints could not be taken out of the plant.

An electric guard system was installed so that when even a slight attempt is made to open the door, a warning light and bell flash at guard headquarters. If the door is cracked open, a light flashes and a bell rings at the door that has been opened so that a guard can readily identify the door when he comes to check. The system was made as foolproof as possible to prevent anyone from tampering with it to make it inoperative.



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12. Split sprockets on chain drive between axles for easy maintenance.
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DIESEL-ELECTRIC LOCOMOTIVES

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NEW BOOKS

for the plant engineer

More on Materials Handling

MATERIAL HANDLING. Booklet No. 4 of the Library of Know-How. Size 8½ by 11 in.; 10 pp; paper bound. Published by The Material Handling Institute, Inc., 811 Clark Bldg., Pittsburgh 22, Pa. Price 50 cents.

IN THIS BOOKLET the organization, engineering and training necessary for correct materials handling is discussed.

It is pointed out in the introduction that the function of materials handling is, at this time, mostly a matter of trial-and-error, and that a balance of authority, responsibility and organization structure may take a long time to achieve. The booklet has then, been prepared for those people interested in accelerating the organized processes for controlling and reducing handling costs.

In an effort to aid in solving organizational, engineering and educational problems, with which the book is mainly concerned, it delves into the functional pattern of materials handling, including the need for efficient facilities, planning and tooling, shipping operations and storage, and packaging.

A list of the manufacturer-members of the Material Handling Institute, Inc., who offer their services in this field, is included in the book.

► Note: PLANT ENGINEERING has 50 copies of this booklet available for free distribution to interested readers. If you would like a copy, write "Material Handling Booklet No. 4" on one of the postcards appearing in this issue. Booklets will be mailed on a "first come, first served" basis.—*Editors.*

On Gas Regulators

GAS REGULATOR HANDBOOK. Size 8 by 5¼ in.; 154 pp; illustrated; spiral bound; first printing, 1953. Published by Rockwell Manufacturing Co., Pittsburgh, Pa. Price $2.50.

HERE IS a thorough coverage of pressure regulation for engineers as well as practical men. Some theory is combined with the practical aspects. Use is made of the publishing firm's designs in the text and illustrations.

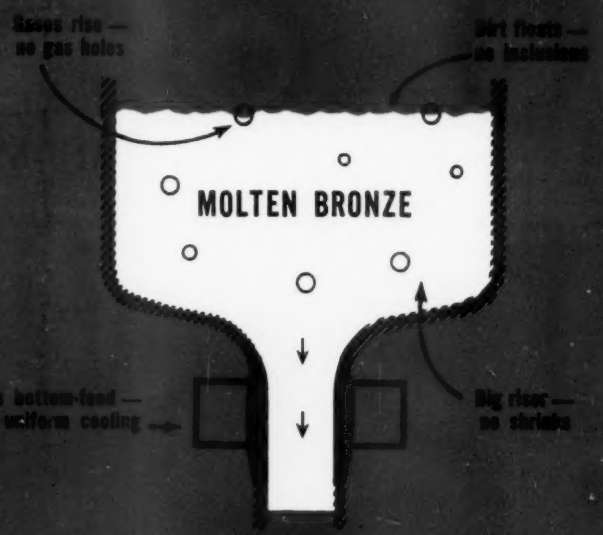
The introductory chapter is given to fundamental principles of regulators and considers such items as regulator elements, effect of spring, diaphragm, body and inlet pressure, small flow characteristics and pilot loading.

Section on regulator maintenance

Save on Bearing Bronzes... Asarco's Continuous-Cast Quality and Sizes Conserve Metal and Machine-Shop Time

You lose metal . . . you lose time . . . you ruin tools . . . when machining uncovers gas holes, shrinks, dirt, inferior metal. But it can't happen with Asarcon 773 (SAE 660) bronzes!

The sketch shows how the patented Asarcon process eliminates the metal defects which gnaw at machine-shop profits. Asarcon 773 assures sound castings, profitable machining.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To keep costs down and production up, keep machines running with Manzel Force Feed Lubricators. They can be installed on machinery you are now using or incorporated into new equipment. For information write:

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takes into account general inspection and contains a list of factors which can cause excessive variation in outlet pressure. Attention is also given to regulator pulsation, vibration and freeezing.

Selection, operation, repair, capacity, installation are some of the other subjects treated in the book. Portion of the miscellaneous information includes the following: physical gas laws and deviations from them; area, pressure, and weight conversion tables; flanges and flanged fitting specifications.

Use of Re-Refined Oil

THE CASE FOR RE-REFINED OIL. Size 11 by 8¾ in.; 101 pp; loose leafs in paper cover. Published by the Association of Petroleum Re-Refiners, 1917 Eye St., N.W., Washington 6, D.C. Price $2.50.

PREPARED for the Association of Petroleum Re-Refiners this study includes a number of excerpts from various newspapers and magazines on re-refined oil. Opinions of a number of personalities are quoted on the subject.

In the report are also given the locations of association approved re-refiners by city and state. A list of American transportation firms reports some of the users of re-refined oil.

Comments of the association president appear in the form of memorandums to members of the federal government and an extensive letter to the director of gasoline and inspection division of the Dept. of Agriculture of North Carolina.

Manual on Ventilation

INDUSTRIAL VENTILATION. Size 11 by 8½ in.; illustrated; approx. 190 pp; paper cover; spiral bound. Published by American Conference of Governmental Industrial Hygienists, Committee on Industrial Ventilation, P.O. Box 458, Lansing, Michigan. Price $3.00.

PLANT ENGINEERS, among others, are offered a revised edition of useful information on a subject that is highly important in industrial operations.

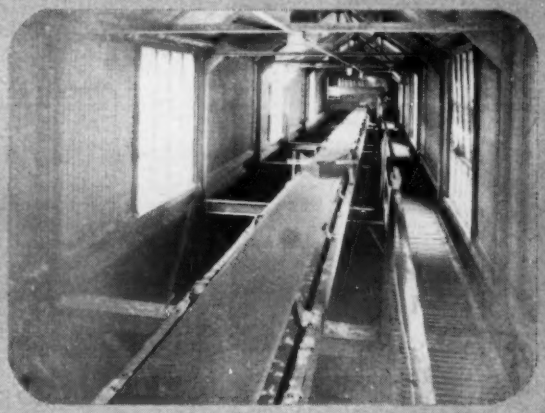
The text is supplemented by many drawings that are presented in draftsman-like style. These cover hoods and designs for specific operations.

One section is devoted to duct design and includes two comprehensive tables of factors and figures involved in exhaust system calculations by two different methods.

Other chapters deal with testing of ventilating systems, fans, air cleaning devices, comfort ventilation and general principles.

An extensive bibliography appears in the back and offers references to further study. Data in the book include equivalent resistance values, friction losses, and velocity pressures.

You save with rubber products made with NEOPRENE



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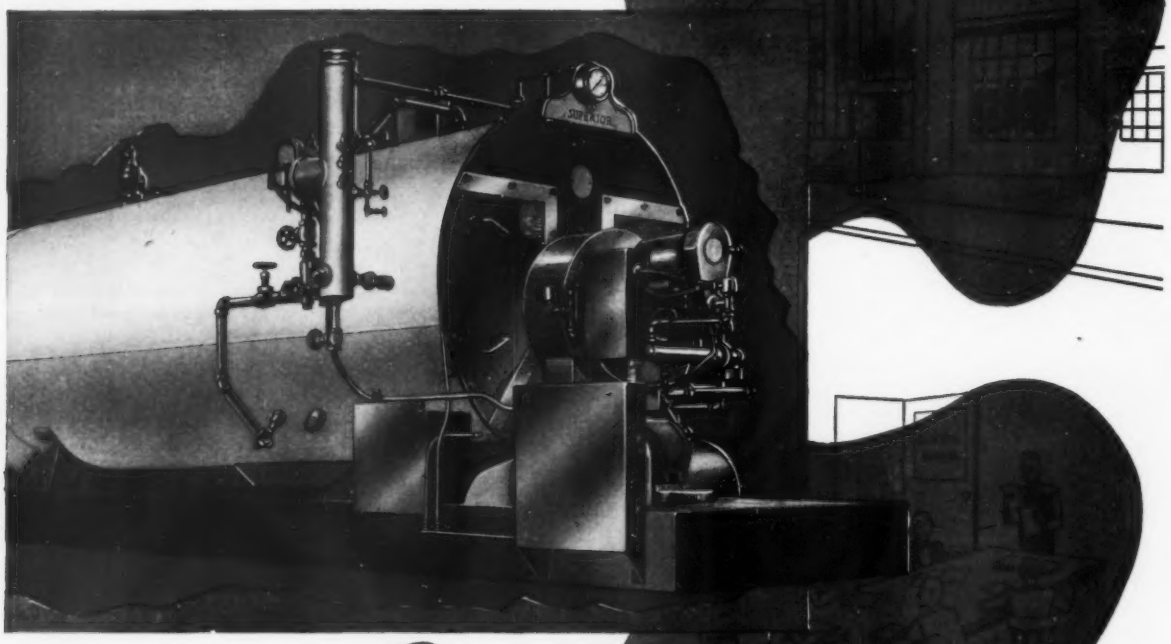

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SUPERIOR
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NEW PRODUCTS

(Begins on page 148)

28—HEAT TRANSFER SYSTEM for process equipment

Thermon, a heat transfer compound, is a primary component of the low-cost Thermonized system of maintaining constant temperatures in process lines and equipment. It is based on the principle of maximum surface contact in heat transfer by conduction. According to company, Thermonized equipment is lower in cost than either jacketed or traced equipment. It involves the use of coils, but differs from conventional tracing in that the Thermon (heat transfer medium) is trowelled on and around the coils to give a heat-conducting surface in contact with the entire fitting.

In Thermonizing piping or equipment, company engineers determine dimensions and placing of tubing, giving consideration to radiating surfaces and potential hot and cold spots. The coils are placed on the equipment, tubing fittings installed and coils pressure tested. Then Thermon is applied over the coils and heat cured until it sets up into a tough, hard, corrosion-resistant jacket which is bonded to both coils and equipment.

Besides its lower cost and temperature-maintaining advantage, Thermon has a long service life, says manufacturer; it can be used in a wide range of temperatures and pressures, and it has good mechanical and thermal shock resistance. It is also pointed out that Thermonizing serves to protect equipment against external corrosion—and, since it separates the product from the heating or cooling medium, it prevents product contamination in the event of failure of equipment walls or tubing. New Thermonized equipment can be furnished, or present equipment shipped to the company for Thermonizing. Thermon Mfg. Co.

29—SAFETY GOGGLES designed to fit all faces

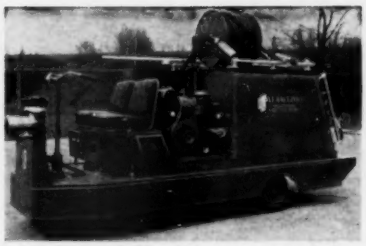
Outstanding feature of the Contour-Spec is its hinged bridge; with this feature, one size fits all faces, broad or narrow, long or short. In addition to the protection afforded, Contour-Specs offer a solution to the problem of keeping a sufficient stock of eye-sizes and bridge widths. The seven-barrel hinge of rust and corrosion resistant nickel silver permits the Contour-Spec to adjust automatically for any bridge width from 18 to 26 mm.

Plastic strips for attaching side shields are molded as an integral part of the frame. This adds strength to the frame and provides full protective closure around the eye cavity. Willson Products, Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on the facing page.

30—FIRE TRUCK rushes hose and equipment to scene of fire

The Fire Fighter, a compact, highly-maneuverable one- or two-man fire truck is designed to get through narrow aisles and standard doors and travel at 15 mph to put out plant fires at their source. It can be equipped to carry high pressure fog systems, 210 gal of water, 100 ft of booster hose, rotary pump, foam concentrate and any extinguishers desired—as well as fire axes, crow bars, first aid kits and ladders. Kalamazoo Mfg. Co.

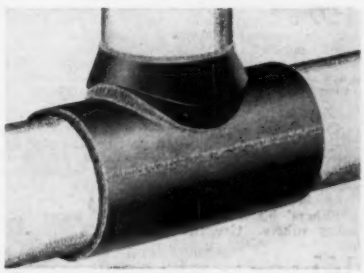


31—CYLINDERS have unusually large capacity-to-size ratio

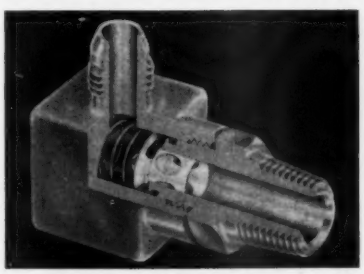
Series 750 Fluid Power Cylinders are announced as offering greatly improved performance. According to manufacturer, they offer more compact size with large capacity and broad application. They incorporate a new cushion design for easy adjustment and are engineered to reduce friction to a minimum consistent with good sealing. Hanna Engineering Works.

32—SPLIT TEE UNIT is assembled, ready to be installed

Specially designed for hot taps and new construction in the oil and gas transmission industries, the new WeldOlet Split Tee is engineered to "nail down the lid" where full encirclement reinforcing is necessary. It is announced as meeting size and service requirements from the smallest sizes to 30 in. outlets for run lines through 36 in. According to manufacturer, it provides an efficient and economical way to handle full encirclement reinforcement of branch connections. Bonney Forge & Tool Works.



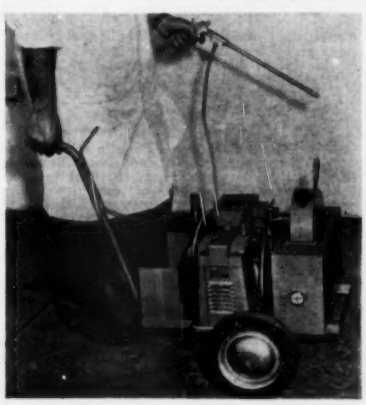
33—RIGHT ANGLE VALVE solves some "problem" installations



The configuration of the P-602 Right Angle Check Valve has been developed by this company to answer the need for a valve having the characteristics of their standard inline 200 Series, but which must fit into a system in a limited space. It is pointed out that the chatter-free zero-leakage design principles used in other valves in the Circle Seal line have been applied to these—and that they will frequently simplify line arrangement and facilitate installation. James-Pond-Clark.

34—VAPORIZER, for insecticide, now has hand spray gun

This company's Super Mistorizer has been made adaptable to all types of insect control operations by the addition of a new hand spray gun. The gun provides residual, contact, or localized spraying in critical or inaccessible areas. The Super Mistorizer now consists of three major components: a 1½ hp compressor unit, a 3-gal insecticide tank, and the new pressure-feed-type hand spray gun. The unit is portable; it is mounted on a welded, two-wheel cart. For vaporizing operations, the machine's two-nozzle head converts insecticide into a dry-mist of insect-killing droplets, so small that they will not wet or condense on the surfaces of equipment with which they come in contact. West Disinfecting Co.



BULLETINS

(Begins on page 29)

156 Saddle-Type Lathes—Catalog 102, 28 pp, describes saddle-type universal turret lathes. Illustrated with photos and drawings, text explains how these lathes offer more power transmission, more width where it counts, rigidity of carriage and turret, ease of operation, accuracy and other advantages. Component parts are discussed in detail, and general specifications included. Jones & Lamson Machine Co.

157 Abrasives, Cutting Tools—This 36-pp catalog titled "Rotary Tools and Grinders" describes, illustrates mounted and small grinding wheels and segments. Gives specifications on carbide and high speed steel rotary files, internal grinding tools. Charts cover abrasive grain selection, safe operating speeds for wheel diameters and tool overhang, application, operating speeds for abrasives, high speed cutting tools. Metal Removal Co.

158 Controlled Quenching—Catalog FR-853 describes two small self-contained units: the Junior quencher and the Perambulator oil cooler. The former is a compact quench system for tool and die shops and wherever small-piece custom heat treating is done. Of greater capacity, the Perambulator oil cooler is a portable combination oil cooler and quench tank. Bell & Gossett Co.

159 Cleaning Coolants—This 8-pp, simply written and humorously illustrated pocket-sized booklet, presents recommendations for cleaning machine tool coolant systems. Outlines advantages of keeping coolant uncontaminated. F. E. Anderson Oil Co.

160 Timesaving Tools—Sixteen-pp Catalog 35-E covers a line of tools for electricians, plumbers and construction workers. Pictures and gives ordering and application information on pipe and tubing benders, cable pullers, joist borers, knockout punches and cutters, plumbers' bit sets and electricians' auger bits, many others. Greenlee Tool Co.

161 Safety for Welding Operators—"Safety," a 32-pp illustrated booklet designed for welding and cutting operators handling oxy-acetylene and arc welding equipment, gives safety cautions and rules for personal safety, handling and maintenance of cylinders, torches, regulators and hoses. Discusses safety practices in all phases of welding equipment handling. Air Reduction Sales Co.

METALS

162 Alloy Castings—Some 175 applications of heat and corrosion resistant alloy castings are discussed, illustrated in Bulletin A-141, 48 pp. Charts compare creep strength of various alloys, resistance to corrosion in certain media, and to oxidation at elevated temperatures. Tables of composition list principal ACI designations, proprietary alloys. The International Nickel Co., Inc.

163 On Major Stainless Alloys—This new technical booklet consists of 11 reference sheets covering major stainless alloys. For each alloy the following information is given: chemical composition, mechanical and physical properties, resistance to major corrosive solutions, machinability, heat treatment and weldability. Also the equivalent ACI, AISI, SAE and ASTM designations are given. The Cooper Alloy Foundry Co.

164 Ductile Cast Iron—Bulletin DI-1, 12 pp, with illustrations, graphs and charts describes this recently developed material, said to combine process advantages of cast iron with engineering properties of cast steel, listed as strengths up to 120,000 psi, considerable ductility, and resistance to heat and wear. Indicates potential uses. International Nickel Co., Inc.

WATER TREATING

165 Demineralizers—Valuable information on demineralization is offered in plant engineers in comprehensive 24-pp Bulletin WC-111. Discusses demineralization in general and its advantages and applications. Basic types of demineralizers and their special uses are charted. Resins, piping, valves and accessory equipment are treated in detail. Book also provides flow charts showing demineralization systems for chemical plants and power plants, and includes operating cost estimation curves. Graver Water Conditioning Co.

166 Mixed-Bed Demineralization—Bulletin 3983, 8 pp, shows how use of a fully automatic mixed-bed equipment to produce make-up water cuts operation costs. Gives operating description of process, shows installed equipment together with a schematic diagram of demineralizer control arrangement. The Permutit Co.

167 Keep Distilled Water Pure—Bulletin 131 describes manufacturer's Ventgard for protecting distilled water in storage from bacteria, dust, mist and gases including CO^2. Shows how Ventgard may be attached to Pyrex or metal storage tank to filter incoming air taken into tank as water is drawn off. Gives laboratory test results of 100 per cent efficiency with particles as small as 0.2 mu. Barnstead Still & Sterilizer Co.

MATERIALS HANDLING

168 Hand Trucks—Pocket-size Catalog 91R, 20 pp, describes, illustrates complete Kemco line of hand trucks including platform, pin, dye house trucks, work boxes, racks and containers. Gives specifications, construction and design features, application data. Describes a new caster for continuous wet conditions. Kennett Equipment & Machinery Co.

169 Screw Conveyors—Described in 4-pp Catalog and Engineering Data Book ID-541 are various sizes and types of screw conveyors, along with photos, line drawings and dimensions. Engineering data is provided to help select proper conveyor and accessories. Tables are included for determining speeds and horsepower. Shows unusual types of conveyors. Industrial Div., Continental Gin Co.

170 Fork Truck Efficiency Test—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

171 Lifters, Elevating Tables—Twelve-pp Bulletin 54 is a generously illustrated presentation of company's Shoplifters, Worklifters, elevating table and smaller handling equipment. Includes specifications and application suggestions and a chart covering four basic hoist units. Photos show various lifting devices in action. Economy Engineering Co.

172 Magnetic Units for Steel Handling—Form B-212, 36 pp, fully illustrated with dimensioned drawings, schematic layouts of suggested application, shows how steel handling equipment using permanent non-electric magnetic units can increase production, reduce downtime. Shows possible application of holding, conveying equipment in skelp, sheet and tin mills. Presents company's new sheet fanner magnet. Eriez Mfg. Co.

CHAINS, WIRE ROPE

173 Wire Rope Recommendations—Designed to offer a simplified ordering plan and reference for plant engineers who use wire rope, this catalog contains about 28 pp and is divided into 16 sections—one for each of the major industries using wire rope. Each section, marked by index tabs for quick reference, gives detailed information on wire rope for specific requirements. Also included are photos showing wire rope applications in construction, shipping. John A. Roebling's Sons Corp.

174 Wrought Iron Chains, Slings—Bulletin C, 12 pp, gives sizes, link dimensions, standard finishes on specific grades of fire welded wrought iron chains in ¾ in. Drawings show most commonly used types of single and double branch sling chains, indicating attachments for wrought iron assemblies. Gives application suggestions, working load limits of each chain. The McKay Co.

HEATING

175 Electric Heating Units—Booklet B-6161, 23 pp, pocket-size, gives data on heaters, thermostats and snap switches for electrical units. Contains tables listing wattage required, supply voltage and dimensions, construction details and mounting instructions. Lists complete line of Corox heaters including immersion, bolt, finned units. Discusses selection of correct heater, giving formulas, graphs, sample problems. Westinghouse Electric Corp.

176 Data on Blast Coils—Valuable handbook data on indirect heating is offered in 24-pp Bulletin CH-532. The Chinook principle of a "pipe within a pipe" is fully covered, and also included are tables of heater capacities, performance curves, physical data, casing dimensions, friction losses and steam properties. Bayley Blower Co.

VALVES AND PIPING ACCESSORIES

177 Valve Chart—Form 194, 24 pp, is a valve comparison chart, listing valve figure numbers of 15 major manufacturers and this company's equivalent valve figure numbers. Compares variety of valves in ferrous and non-ferrous materials, describes different valve lines. The Ohio Injector Co.

178 Steel Gate Valves—Five types of Hancock general purpose steel gate valves for process and power piping systems are described in illustrated Bulletin 202 B, 12 pp. Material specifications, dimensions are given, also non-shock service pressure ratings. Manning, Maxwell & Moore, Inc.

179 Ball Valves—Eight-pp Bulletin 159 introduces a line of manually-operated ball valves in sizes from 12 to 48 in. for shut-off service at pressures to 150 psi for water works and industrial applications. A technical section on valve characteristics covers closing conditions, tightness of closure, leverage, operating mechanism. Valve Div., S. Morgan Smith Co.

180 For Hot Underground Pipes—This 20-pp technical data manual on Gilsulate insulation shows how it serves to insulate and protect hot underground pipes. Explains its three-zone protection feature, discusses Gilsulate grades, and tells how to determine ditch size for pipe installation. Performance data is presented in detail. American Gilsonite Co.

181 Graphitization Study—A study on graphitization (a phenomenon of carbon migration in the heat affected zone of welded piping in high temperature service) is now available in reprint form to plant engineers who were unable to obtain copies of the original article offered some time ago. The 12-pp reprint discusses graphitization from the standpoint of temperature, chemical composition, deoxidation practice. Gives methods for correcting graphitization. Edward Valves, Inc.

PLASTICS, CHEMICALS

182 Plastic Data Book—Catalog B-5878, 50 pp, illustrated in color, is a handbook on industrial Micarta plastic, giving all grades and forms in which it is supplied, also chemical, mechanical and electrical properties of each. Color-keyed for easy reference, handbook discusses laminated and molded micarta, giving design and application information on directional loads. Westinghouse Electric Co.

183 On Heat Resistant Resins—Recent property, form, and fabrication data on fluorothene resins is compiled in this 16-pp booklet. Much information on these high heat-resistant resins is provided. Recommendations on extrusion, injection and compression molding are included. Bakelite Co., Div., Union Carbide and Carbon Corp.

184 Ethanolamines and Their Uses—This 40-pp technical bulletin on monoethanolamine, diethanolamine, and triethanolamine, presents their physical, toxicological and chemical properties, sales specifications, methods of analysis, uses, and handling and storage information. An introductory section touches on their development of these amino alcohols, and a bibliography lists 381 references. Bulletin describes the broad use pattern of the three compounds. Jefferson Chemical Co.

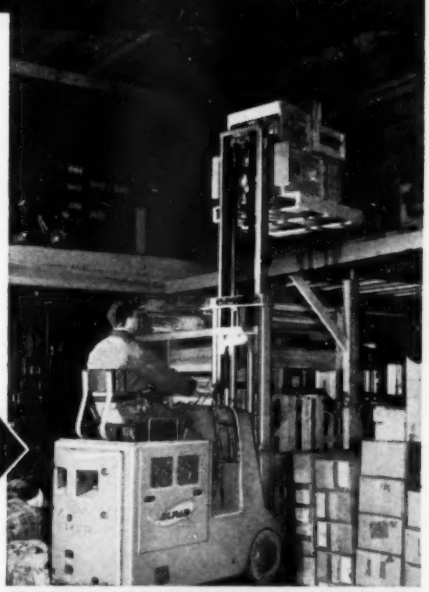
LAYOUT EQUIPMENT

185 Charting Method—This 16-pp brochure details a method of prefabricated charting of statistical charts, organization charts and office layouts, and provides facsimiles of the pressure-

4-way savings with ELPAR trucks

SAVES TIME

Grocery chain uses ELPAR fork truck to move 2,000 cases of food from boxcar to their warehouse. Job formerly took 20 man-hours. Truck now does it in 12—*60% Faster!*

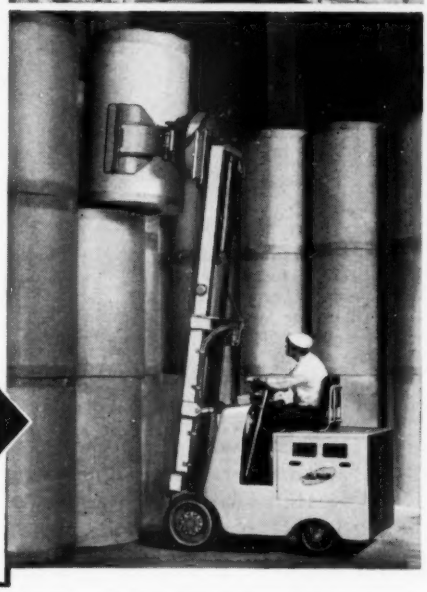


SAVES SPACE

Wholesaler *increased by 50%* the effective capacity of his one-story warehouse with this ELPAR fork truck. Truck acts as "mobile elevator" to utilize space on balcony.

SAVES LABOR

In cold storage plant, four ELPAR trucks *released 16 men for other duties!* Also permitted roof-high storage, and safeguarded perishable foods by faster handling.



SAVES MONEY

Newspaper high-stacks its roll paper with ELPAR Clamp Truck, thus avoiding *$10,000 more storage costs!* Truck repaid its cost in a few months.

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- ☐ Specially-Engineered Trucks
- ☐ Preventive Truck Maintenance
- ☐ Case Histories on above jobs

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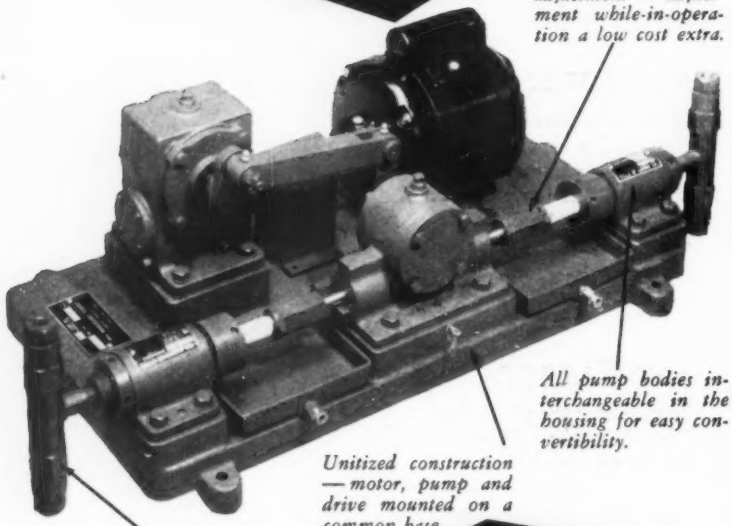
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BULLETINS

(Begins on page 29)

sensitive components. Besides suggestions on charting, includes description and prices of the items utilized. Chart-Pak, Inc.

186 **Timesaving Layout System**—This bulletin describes a low-cost plant layout system involving use of photocopy. Photos and brief text show how it saves drafting time, offers other benefits. Peerless Photo Products, Inc.

PLATFORMS, SEATS

187 **For Higher Level Work**—Illustrated folder describes manufacturer's all-steel portable and stationary platforms custom-fitted to work requirement, and designed for increased production, safety and convenience in working at high levels. Shows platforms for large equipment repair, production operations, maintenance. Ballymore Co.

188 **For Sitting Down on the Job**—"Stoolcraft" is a gayly illustrated 12-pp booklet on the art of sitting down on the job in industry. Woven into the text are descriptions of various seating arrangements available, their sizes, materials, features. Standard Pressed Steel Co.

OTHER EQUIPMENT

189 **On Steel Tubing**—Twelve-pp Form 1120 shows some of the many uses of steel tubing, and tells how it is made. Forming, standard finishes, cutting and machining are discussed and illustrated. Mechanical properties and specifications for manufacturer's steel tubing. Rochester Products, Div., General Motors.

190 **Heavy Duty Fans**—Eight-pp Catalog 1380 describes three classes of company's Series 2000 heavy duty fans for induced draft service. Gives maximum wheel speeds, total pressures, volume ranges. Presents graph of certified hp, efficiency and pressure rating of new blade design, factors contributing to ratings. Discusses optional inlet damper control. Sturtevant Div., Westinghouse Electric Corp.

191 **Coated Abrasive Technology**—Originally issued in 1945 this 36-pp handbook and digest of coated abrasive technology has been revised and brought up-to-date. Discusses grading and heat treating of grain, trade names, fragile and tough grains, backings, cloth filling and finishing. Methods of manufacture are also covered. Clover Mfg. Co.

192 **Versatile Construction Material**—This attractively illustrated 32-pp brochure describes Bondolite, a high-strength, lightweight sandwich structural material. Tells advantages of the material and shows some of its present uses. A section of engineering data covers core and face materials and adhesives, weights, strengths. Goodyear Aircraft Corp.

193 **Weldless Rolled Rings**—Eight ways to improve product design through use of weldless rolled rings are explained in this folder. Describes and pictures rings in sizes to 240 in., weights to 40,000 lb. Advantages are presented along with typical applications including ring gears, heat exchangers and vessels. Ladish Co.

194 **Gage Selector**—Selection of proper pitch diameters for all American or Unified thread plug or ring gages is made easy with this slide-rule, Form SH-454. Includes directions for use, ordering suggestions for gages. The Sheffield Corp.

195 **Industrial Waste Treatment** — Advantages inherent in the treatment of industrial waste waters and process liquors are described in Bulletin WC-116. Schematic drawings, pictures and a problem-solution-result type of explanation show how company's equipment solves such problems as process and cooling water shortages, contamination of streams with plant effluents, and the loss of valuable heat and materials in discarded waters. Graver Water Conditioning Co.

196 **Tank Cleaning**—Advantages on cleaning tanks with inhibited chemical solvents are discussed in this 4-pp bulletin. Chart on back shows typical examples, specifications, of industries using company's service. Dowell Inc.

As never before...

Today we are all aware of the disastrous and far-reaching effects of a major industrial fire. Owners . . . management . . . employees . . . customers . . . almost every one suffers, in one way or another, when a serious fire strikes.

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DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 171-172.

MATERIALS HANDLING

201 **Data on Tramrail Equipment**—Twelve-pp Form 2008F is a well organized booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

202 **Engineered Monorail Applications**—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

203 **Metal Conveyor Belts**—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

204 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastening are also covered, and there's a table listing common conveyor belt maintenance problems with their causes and remedies. The B. F. Goodrich Co.

205 **Oilless Bearings for Conveyors**—Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

206 **Conveying Systems**—How this manufacturer's conveying systems are being used in handling dry pulverized and granular materials is shown in illustrated Bulletin FK-26, 16 pp. Types of systems and component parts are described and many typical installations pictured. Fuller Co.

207 **Manual on Electric Hoists**—Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

208 **Industrial Lifts**—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, service lift. The Wayne Pump Co.

209 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

210 **How to Operate a Crane**—Booklet 920 is a 48-pp generously illustrated instruction book on crane operation, helpful to both beginner and seasoned operator. It shows hand signals, defines crane and hoist terminology. Covering all phases of crane operation, it discusses in detail the coordination of crane motions, and includes safety rules and inspection, maintenance tips. Individual copies of this book are free to qualified plant engineers. The Electric Controller & Mfg. Co.

211 **Trolley Hoists**—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

212 **Locomotive Cranes**—Catalog 84, 16 pp, stresses advantages of the torque control unit used in company's cranes and features illustrations of the mechanism and converter unit. Describes in detail the sealed, anti-friction bearings, air controls, brake, limit switch and other components. Orton Crane & Shovel Co.

213 **Shovel and Loader**—Described in 12-pp Bulletin 1932 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

214 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, along with general specifications. American Hoist & Derrick Co.

215 **Truck Operating Tips**—How to get the most out of walkie-type electric industrial trucks is told in revised Bulletin P-1033, 16 pp. Using brief text and interesting cartoon technique to illustrate the points, booklet serves as a guide for efficient operation and maintenance of company's Worksaver electric trucks. Its approach is general enough, however, to be of value in the operation of any motorized hand truck. The Yale & Towne Mfg. Co.

216 **For "Floor Level" Handling**—Junior Catalog 535 is the 100-pp eleventh edition of company's well known pocket-size catalog. Contains information, illustrations and specifications on fork trucks, high lift electric trucks, pallet trucks, industrial tractors, electric and hand lift trucks, Steeleg skids and boxes, semi-live skids and lifters, portable elevators and cranes, stacking frames, storage racks, die tables, and other handling specialties. Barrett-Cravens Co.

217 **How to Pick a Truck**—Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrates important construction and design features. The Baker-Raulang Co.

218 **Elevator Sills**—This illustrated bulletin describes elevator sills which operate like a drawbridge. Features a model for mounting on the elevator itself which, when lowered, bridges gap between floor and elevator and, when upright, serves to keep trucks from rolling to elevator edge. Also describes a model for mounting to building floors, one designed for truck loading and other special models. Alexander Sill Co.

219 **Railway Car Mover**—"Reports from the Field on Trackmobile Savings and Advantages" tells how this small unit travels on road and track hauls and switches freight cars and requires only one operator. Stresses economy and easy handling. Whiting Corp.

220 **Handling Equipment**—Several of this manufacturer's new products are described in this comprehensive 48-pp catalog, including steel boxes with lap joints, a stand and reel for handling steel coils and a new type nesting stacking box. Book presents a wide range of other materials handling equipment—stacking boxes, skid boxes, skids, racks, trucks and trailers. Fully illustrated, gives sizes and application suggestions. Palmer-Shile Co.

221 **Portable Hoists**—This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.

222 **Industrial Logistics**—Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

223 **Shock Absorbing Casters**—Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

224 **Trucks, Casters, Wheels**—Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks dollies, trailers, casters, wheels offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

CONSTRUCTION

226 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Alan Wood Steel Co.

227 **Heavy-Duty Flooring**—An emery aggregate flooring for heavy duty use is discussed in 8-pp Bulletin 653. Gives test data on this flooring. Describes safety features, improved trucking, heat resistance and other advantages. Walter Maguire Co.

228 **Painting with Aluminum**—Again made available to plant engineers is Form AD-228, 32 pp, on the use of aluminum paint. Discusses advantages of aluminum paints, describes three basic types for non-absorbent surfaces for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

229 **Lowdown on Suspended Ceilings**—Twelve-pp Bulletin A-129 is a "tell-all" brochure on a radiant panel heating, cooling, and acoustic control ceiling. Tells how company's three-way functional (suspended) ceiling is easy to lay out and install, competitive in cost. Diagrams and charts accompany text, which includes a brief of 12 advantages of this ceiling. Also provides departmentalization of components, performance characteristics, design and layout procedures, installation short cuts. Burgess-Manning Co.

230 **Waterproofing Membrane Fabric**—The use of Fiberglas in company's waterproofing membrane is told in "Let's Look At Membranes," 16 pp. Comparisons of Glasfab and other types of membranes are drawn, and complete application methods described. Several case histories, covering industrial roofing jobs, highway bridges, pipe lines and chemical piping, show versatility of product and how it is applied. Twinsburg-Miller Corp.

231 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastening. A table shows properties, sizes available and intended applications. Masonite Corp.

232 **Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into

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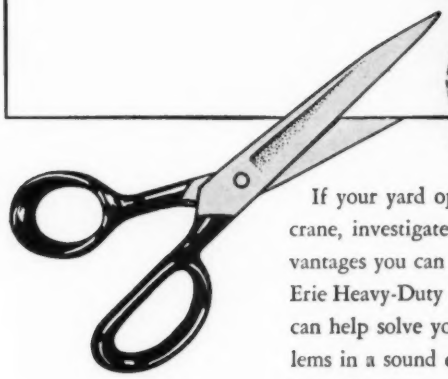

If your yard operations call for a crawler crane, investigate the many cost-cutting advantages you can get with the new Bucyrus-Erie Heavy-Duty 22-B. Here's a machine that can help solve your material handling problems in a sound economical way. Look over these important features — see what they can mean to you in lower material handling costs, lower production costs.

POWER CONTROLLED LOWERING on main hoist line plus fully independent control of boom hoist and lowering permits the heaviest of loads to be inched into position.

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HEAVY-DUTY BOOM, extendible to 70′ by inserting sections, lets you build your stockpiles higher and save storage space.

JIB EXTENSIONS in 10- or 20- or 30-foot lengths, available for special high lift crane service, can be added without removing sheaves, guards, or suspension ropes from upper end of boom.

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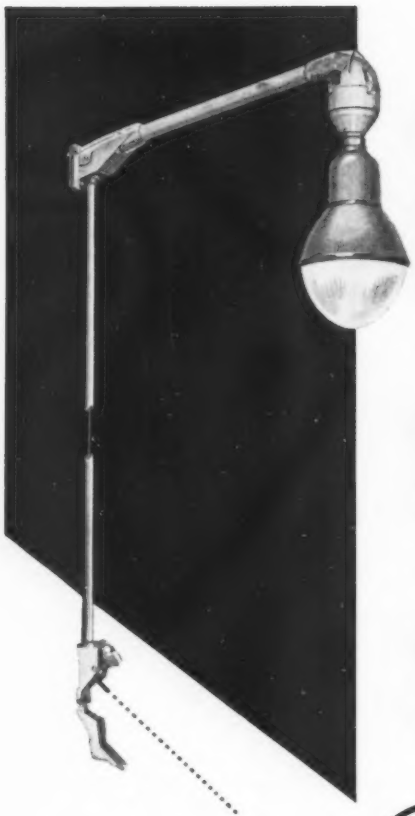

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Rapid, safe, ground-level luminaire maintenance is guaranteed when THOMPSON "Servisafe" wall bracket units are installed. Incorporating a patented disconnecting and lowering mechanism, these easy-to-operate units completely eliminate dangerous climbing. In addition, because lowered luminaire is "dead", there are no electrical hazards for maintenance men. Servicing time and costs can be cut to absolute minimum.

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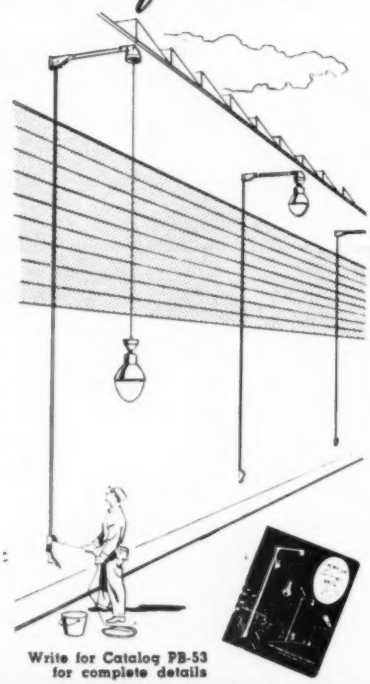
"Servisafe" models for wood pole bracket mounting as well as complete metal pole assemblies also are available.



1968-TE

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DATA FILE

(Begins on page 178)

steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

233 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

234 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

235 **Industrial Doors**—This 16-pp 1954 door catalog furnishes listings and illustrations of manufacturer's line of doors, and provides helpful information on their use. Describes designs for turn-over, bi-fold and telescoping canopy doors, vertical lift, slide, and special purpose doors. International Steel Co.

MAINTENANCE

237 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

238 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

239 **Blower-Suction Cleaner** — Data on a portable combination blower-suction cleaner for cleaning machinery motors, stock bins are offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

240 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

241 **Metal Primer**—This folder describes Ospho, a metal primer which is applied right over rust and stops rust action. Tells advantages of Ospho for rusted metal and as a primer for new metal, explaining how it serves to protect the metal. Rusticide Products Co.

242 **Protection Against Rust**—This bulletin describes and gives application data for Z.R.C., a coating applied to iron and steel to provide a dried film protective coating of 93 to 95 per cent pure zinc. The Sealube Co.

243 **Proper Care of Floors**—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, wood. West Disinfecting Co.

244 **Vacuum Cleaning Equipment**—Vacuum cleaning units to suit requirements for commercial buildings, industrial plants and buildings where noise is objectionable are listed in illustrated Bulletin 152. Also shown are furnace

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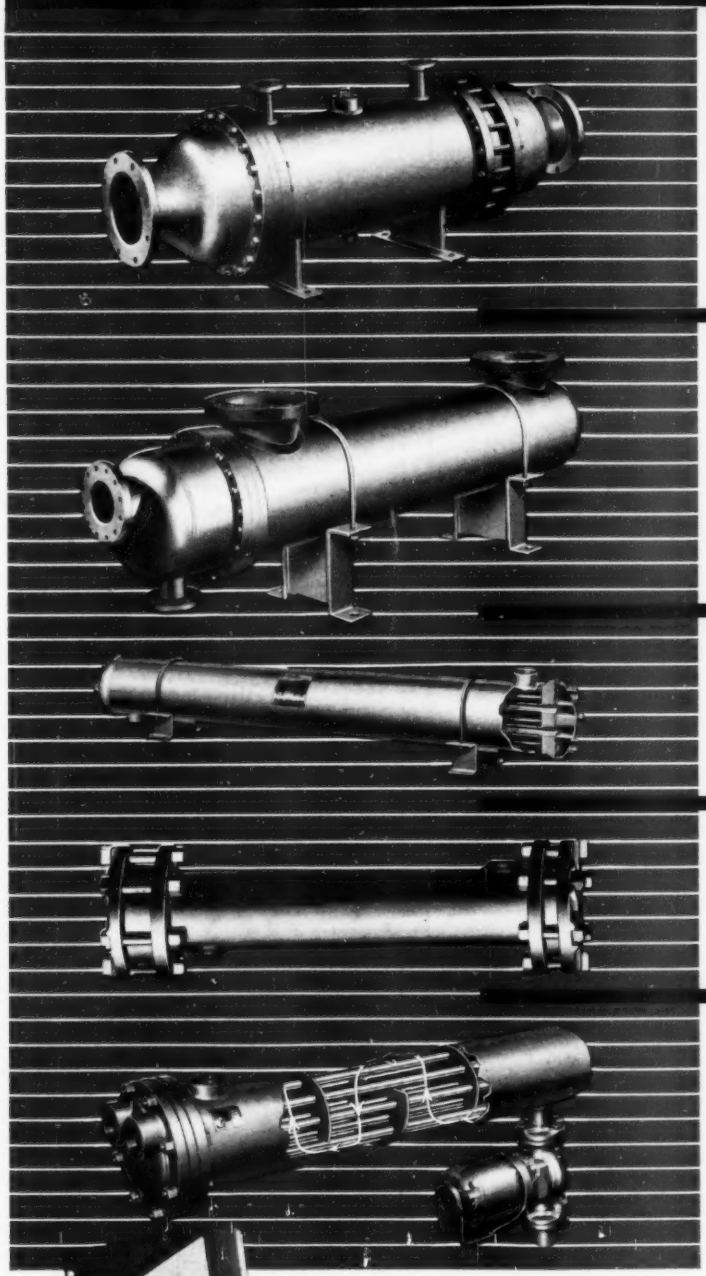

TYPE "OC" STRAIGHT TUBES

Sound design, plus precision manufacture, assure efficient operation. Removable tube bundle easily cleaned inside and out. Minimum free annular area and baffles with close tolerances reduce by-passing around the tube bundle. Other features include high tensile strength bolting, full thickness tube sheet and ample metal ligaments between tube holes. ASME quality at no extra cost.

TYPE "U" U-BEND TUBES

Recommended where the lower price of a single tube sheet unit is a necessary economy. These exchangers are also desirable where temperature differential across the tube bundle is extreme. Features include external gaskets, full tube bundle and close tolerance baffles for minimum by-passing. Metal ligaments between tube holes are extra large for internal strength. High tensile strength bolting. ASME quality fabrication.

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Reduce viscosity of heavy oils to permit pumping—control temperatures for proper atomizing of different oils. Units are available in straight tube and U-bend construction, for steam or water as the heating medium and with 2 to 10 passes.

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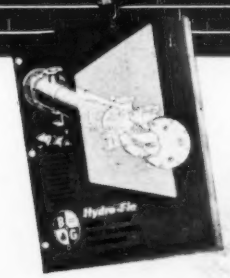
Produce large volumes of hot water from amazingly small units. Boiler water is pumped by a B & G Booster through the shell, greatly increasing the capacity of the heater. This also permits close control of service water temperature. Because of pumped circulation, connecting pipes and fittings are reduced in size, saving material and labor. "WU" Heater is instantaneous—no tank needed.



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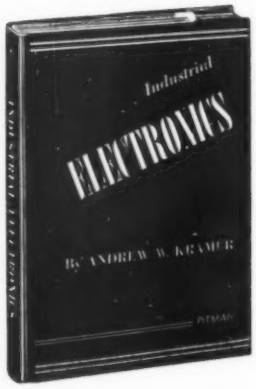

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DATA FILE

(Begins on page 178)

cleaners, units for emptying sump tanks, belt-drive units and special units. The Spencer Turbine Co.

245 **How to Paint a Fence**—The use of this company's FencPainteR equipment for efficient and economical painting of fences is shown in this 32-pp brochure. Covers painting of wire, bar, board, picket and other fences, also masonry and brick walls, galvanized stucco and frame buildings. Gives ordering data on applicators, paint receptacles and kits, enamel, also special equipment and painting accessories. Fence Painter Corp.

LUBRICANTS, LUBRICATION

247 **Cooperative Technical Consultation Service**—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metal-working operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

248 **Multi-Purpose Grease** — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, protects against rust and corrosion. Socony-Vacuum Oil Co.

249 **Force Feed Lubricators**—12-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Discusses drive arrangements. Manzel Div., Frontier Industries, Inc.

250 **High Temp Lubrication**—How "dag" colloidal graphite has been used successfully in various lubricating applications involving temperatures up to and over 2000 F is described in Bulletin 423. Acheson Colloids Co.

251 **Automatic Lubrication** — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 pints with 1 to 24 feeds per unit. Hills-McCanna Co.

252 **Lubrication of Chain Drives**—Vol. 39, No. 8 of Lubrication offers a 10-pp discussion on chain drives and their lubrication. Covers types of chains, conditions affecting their lubrication, choice of lubricants. Includes table showing lubricant recommendations for chain drives. Generously illustrated with photos and sketches showing chain arrangements, methods of lubrication. The Texas Co.

DUST CONTROL

254 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

255 **Dust Control** — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

256 **Improved Dust Filters**—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters that can be furnished for unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are described in detail. The Day Co.

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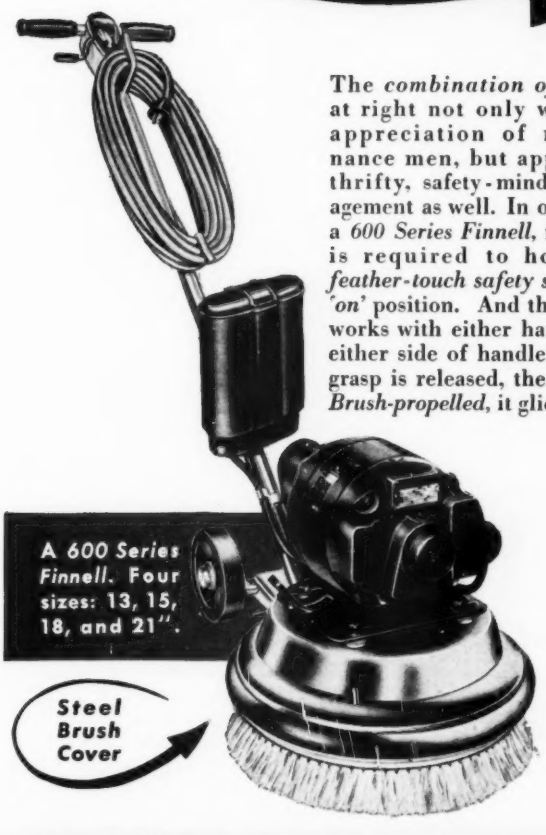

A *600 Series Finnell*. Four sizes: 13, 15, 18, and 21".

Steel Brush Cover

The *combination of extras* at right not only wins the appreciation of maintenance men, but appeals to thrifty, safety-minded management as well. In operating a *600 Series Finnell*, no effort is required to hold the *feather-touch safety switch* to *'on'* position. And the switch works with either hand from either side of handle! When grasp is released, the switch automatically disengages and the machine stops. *Brush-propelled*, it glides over the floor with virtually effortless guidance. True balance is attained through proper distribution of weight per square inch of brush surface in relation to thrust and brush speed. Indicative of the quality construction of a *600 Series Finnell* are: G. E. Drip-Proof Capacitor Motor (furnishes abundant power)... worm gear of special phosphorus gear bronze, meshing with worm of hardened, ground, and polished gear steel ... New Departure Ball Bearings. Although essentially a polisher-scrubber, with suitable accessories the machine can also be used to apply wax, dry-scrub, steel-wool, sand, and grind.

Another of the *extras* offered by *Finnell* is *nation-wide service!* There's a *Finnell Floor Specialist and Engineer* near you to help solve your particular problems... to train your operators in the proper use of *Finnell Equipment*... and to make periodic check-ups. It's also good to know that *Finnell makes everything for floor care!* For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5307 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

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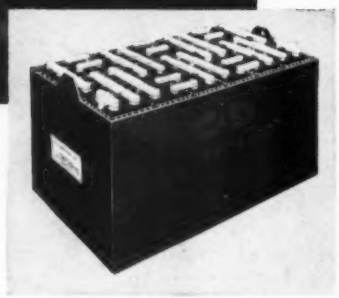
At American Stores Co.

Stacking cereals at American Stores Co. 4-block long warehouse, 59th and Upland Way, Philadelphia.



C&D Batteries for EXTRA work

American Stores Co., one of America's best known food chains sold more than $600,000,000 worth of foodstuffs to their customers last year. To help handle the millions of pounds of dry groceries, meat, produce and other products that move through the company's 13 warehouses every week, American Stores Co. uses C&D Slyver-Clad* batteries at a number of these installations to power their industrial trucks. For American Stores Co., like hundreds of other leading companies, has found it pays to power with C&D Slyver-Clad batteries.

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*T. M. Reg.

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Manufacturers of Industrial Batteries since 1906

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DATA FILE

(Begins on page 178)

257 Dust Collectors—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

258 Dust and Fume Collector — Revised Bulletin 164-3 describes automatic bag type dust arresters, with illustrations of principal components and schematic diagram of typical installation. Capacities under 2 to 1 and 3 to 1 cfm ratios are quoted in table of arrester sizes and dimensions. Collecting efficiency and other advantages offered by cyclic cleaning are discussed. The Northern Blower Co.

INSTRUMENTS, CONTROLS

259 Control Centers—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided and handy space requirement tables included. The Clark Controller Co.

260 For Liquids Worth Storing — Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct-and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

261 Wide Range Regulator — Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

262 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. U. S. Gauge Div., American Machine and Metals, Inc.

263 Oxygen Analyzers, Recorders—Bulletin 105, 6 pp, describes and pictures oxygen analyzers and recorders giving their general characteristics, and features, explaining their paramagnetic principle of operation, and discussing their applications. Covers both deflection and null type analyzers; discusses sampling requirements. Arnold O. Beckman, Inc.

264 How to Weigh Tanks—Bulletin 4106, 8 pp, explains how to weigh the contents of tanks, bins, and hoppers electronically with company's SF-4 load cells. Also covers installation design considerations such as mountings, temperature effects, corrosion protection, and vibrations. Diagrams and sketches accompany text. Baldwin-Lima-Hamilton Corp.

265 Square Design Cylinders—Illustrated 8-pp Bulletin H-104G gives engineering, design, construction, mounting and dimensional data on a line of space-saving square-design hydraulic cylinders for 2000-3000 psi operation. Arrangement of these data permits quick selection of desired model and bore size and the obtaining of complete mounting and dimensions for model selected. Bulletin covers 13 mounting styles. Miller Fluid Power Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

266 Pipe Tool Book — This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

267 Pipe Tool Ordering Guide — Catalog 2-51, 8-pp, covers company's line of threaders,

It gets to the job on road wheels... then quickly moves freight cars!

TRACKMOBILE

...seasoned workhorse in every industry!

It *pulls* freight cars... *switches* them... *spots* them! The Trackmobile does *all* these jobs with amazing versatility because it operates on road or track—*can't* be bottled-up.

Three years ago the Trackmobile was introduced. Today it reduces costs, saves man-hours, speeds freight car movement for firms in scores of industries! It has *proved* itself in all types of uses, be it quarry or steel mill, foundry or refinery. It will do an outstanding job for *you* ... look into Trackmobile advantages now!

WHITING CORPORATION
15697 Lathrop Ave. • Harvey, Illinois

Write Today!

... ask for case histories of the Trackmobile in action!

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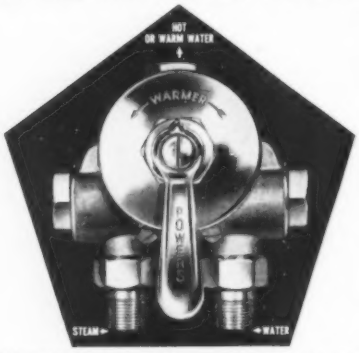
For a Small, Localized Supply of Warm or

HOT WATER

Use

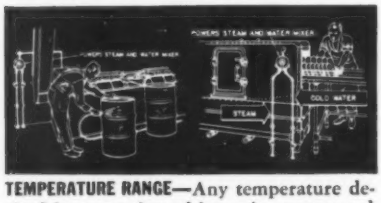
POWERS

STEAM and WATER MIXERS



ECONOMICAL—Quickly pay back their cost. Thousands now in use. *Easy to install.* Requires steam and water pressures above 10 lbs. Steam is mixed directly with water.

MANY USES—Industrial processes; 180° F. sterilizing rinse water for dishwashers; washing oil drums, trucks, etc.



TEMPERATURE RANGE—Any temperature desired between that of incoming water and 200° F.

HAS PRESSURE EQUALIZING VALVE—which prevents delivery temperature changes caused by fluctuating pressures of steam or water.

SMALL SIZE—½" pipe size can be held in the palm of the hand, weighs 12 lbs., ¾" size weighs 23 lbs.

CAPACITIES—based on steam and water at 45 lbs. pressure each, water at 60° F., and delivery temperature of 160° F.:—½" size = 3 gals. per min.; ¾" size = 8 gpm. Mixing stream with 140° F. water increases delivery about 75%. Often used as a small booster heater. ***WRITE for bulletin 369***

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3400 Oakton Street **Skokie, Illinois**

Please Send Bulletin 369.

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For more facts circle 614 on Reply Card

DATA FILE

(Begins on page 178)

cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

268 Machine Tools, Their Lubrication—A history of machine tools, and explanation of their mechanical aspects and an analysis of the role of lubricants in their maintenance and operation are contained in this 80-pp booklet. Not a manual on tool lubrication, this book is a comprehensive discussion of fundamental factors in the construction, operation and maintenance of modern machine tools. Shows how power is controlled and force directed to shape metal by cutting and chipping; analyzes factors that contribute to friction and wear; and describes role of lubricants. Shell Oil Co.

269 Improved Cutting Oils—Cutting oils for keeping parts and tools up to 50 deg cooler and representing a new concept in non-emulsifying oils are described in two new technical bulletins. Form A-2724 describes Sunicut 11-S and 209-S, non-staining dual-purpose oils primarily for medium duty to heavy duty operation on automatic screw machines. Form A-2723 covers Sunicut 102-S and 110-S, which contain active-type sulfur and are effective for heavy-duty operations. Sun Oil Co.

The two Reader Service Cards on pages 171-172 are easy to use and need no postage. Just circle the item number of catalogs wanted.

270 Automatic Flame Cutting—This 12-pp article titled "Advanced Automatic Flame Cutting for Machinery Weldments," tells how a power shovel manufacturer converted from castings and riveted structures to weldments. Discusses problems involved in this change, tracing development and utilization of chain type flame cutting in the fabrication of units for power shovels. Tells how use of electronic tracer can improve flame cutting flexibility and increase production capacity while reducing cost of parts. Air Reduction Sales Co.

271 Data for the Shop—"Fluids and Facts For Metal Working," is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their functions and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Booklet also includes product data on industrial oils, machine tool lubricants, greases, quenching and tempering oils. Standard Oil Co. (Ind.).

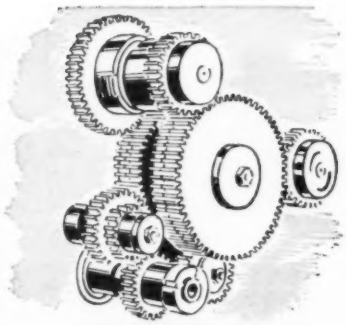
FANS, BLOWERS

272 To Exhaust Fumes—Bifucator Bulletin DB-4-52 describes fans designed to exhaust fumes at top efficiency by avoiding a directional change in the air stream. Details features of the fans, gives capacities. DeBothezat Fans Div., American Machine and Metals, Inc.

273 Industrial Exhaust Fan—Housing design, wheel construction and standard arrangements of manufacturer's Type EX exhausters are discussed in illustrated Bulletin C-46EX. Provides capacity tables, dimensions and photos of standard and special fan. Bayley Blower Co.

274 Fan Engineering Data—Bulletin A-108, 166 pp, gives fan laws and formulas, terminology, and recommended velocities for exhaust hoods. Includes air pressure conversion table, charts on dust resistance, entrance losses and rectangular equivalent of round ducts. Discusses fan installation, maintenance and lubrication, also noise problems. Hartzell Propeller Fan Co.

275 Industrial Fans—Propellair Bulletin 650, 12 pp, contains dimensions, application,



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Fluids and Lubricants

have...

HIGH

- film strength
- load-carrying capacity
- anti-wear qualities
- resistance to sludging and carbonization
- viscosity indexes

UCON synthetic lubricants promote lower operating temperatures of gears, speed reducers, and bearings—which, in turn, lengthens the life of the unit *and* the lubricant. In actual service, UCON lubricants often produce higher power-transmission efficiency than other lubricants.

Find out how UCON lubricants can help solve your tough lubrication problems. Write today for complete information.

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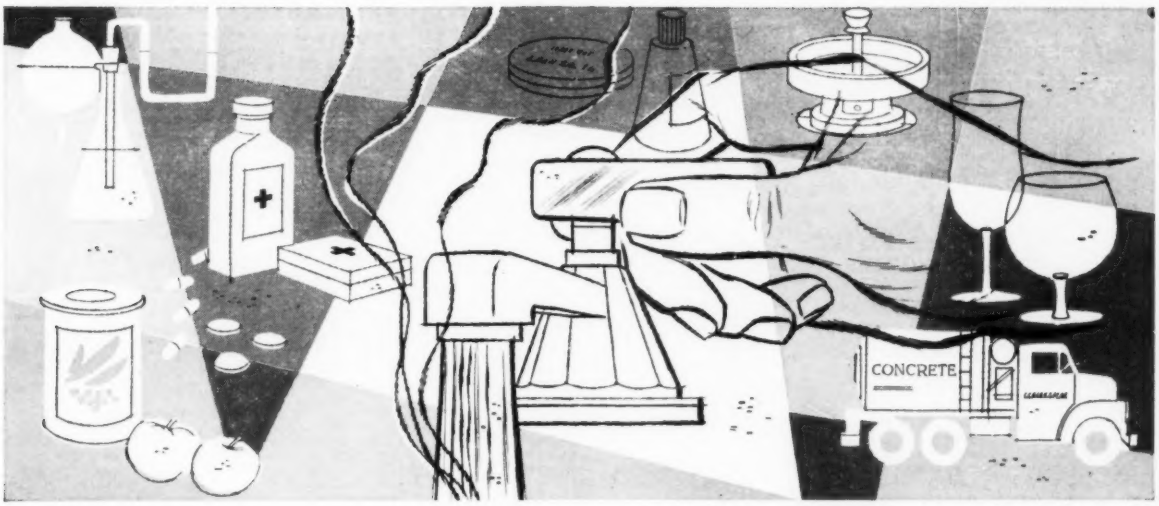


Do any of your plant applications require *Special Temperatures?*

Let us show you how ONE tank simultaneously provides water at 180° for sanitizing—140° for other uses!

Here's a system that's specifically designed for the hot water "problem-child." So if yours *is* a problem, you can appreciate the importance of a continuous supply of hot water at *two* different temperatures: *Sanitizing* hot water anywhere it's needed; *tempered* hot water where it's wanted.

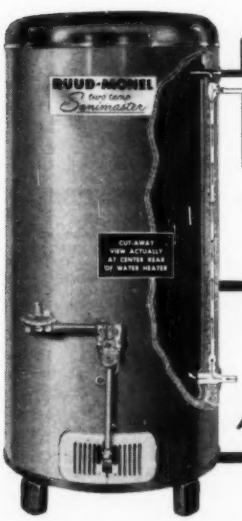
Ruud-Monel two°°temp Sanimasters supply *both* these temperatures *from the same tank at the same time!*

Hot water at *any temperature* for commercial and industrial processes

Some of its many applications: Chemical processing; food processing; glass polishing and cutting; manufacture of cosmetics and pharmaceuticals; concrete mixing; heating oil for processing; metal cleansing operations; bottle washing; de-aerating transformer oil; laboratory use; indirect heating of industrial liquids such as electroplating baths, soap kettles and water-purifying chemicals—*wherever* you need hot water at a selected and constant temperature.

Rust-proof Monel—the Wonder Metal —*safely holds water at 180°!*

Will not rust, ever. Ruud-Monel Sanimaster, with its exclusive, long-life Monel tank, provides sparkling hot water for years and years.



180° SANITIZING HOT WATER is piped directly into operations requiring it. This extra-hot water provides positive bacteria destruction, perfect sanitation.

140° GENERAL-USE HOT WATER always on tap. For Bradley wash fountains, first-aid rooms, lavatories, showers... anywhere you need regular temperature hot water.

FREE CONSULTANT SERVICE!
A Ruud engineer will gladly analyze your specific hot water problem. Or, if you prefer, we will send you literature.

Mail this Coupon Today!

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DATA FILE

(Begins on page 178)

and performance data of Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

VALVES, TRAPS, PIPING AND ACCESSORIES

277 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions and specifications. Walworth Co.

278 **Valves and Fittings**—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

279 **Relief Valves**—Twenty-pp Publication 5200 is replete with data on company's multiport relief valves for steam, air and gas service. Charts, diagrams, tables and examples of plant operating conditions serve to show how to select a relief valve. Text and illustrations show advantage of these valves over other relief valves, and booklet also shows how the Multiport relief valve can be used as a differential pressure spillover valve or as a check valve in closed systems. Cochrane Corp.

280 **Bronze Gate Valves**—Illustrated Circulars 534 and 574 describe a line of 150- and 200-lb service pressure bronze gate valves. Complete with dimensions, these circulars give advantages of flange and screw gate valves in rising and non-rising stem types. The Lunkenheimer Co.

281 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

282 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

283 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

284 **Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

285 **Unions and Fittings**—Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees, fittings. Dart Union Co.

286 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

287 **Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

288 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

289 **Piping Pointers — This** is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

291 **For Stopping Pipe Leaks**—Illustrated Catalog 54, 32 pp, describes, gives specifications of manufacturer's line of steel, cast iron pipe repair clamps, service saddles, valve and bibb reseaters. Tells how to repair all types of leaks in water, steam, gas, oil lines, also gives installation tips. M. B. Skinner Co.

PUMPS, COMPRESSORS

293 **Installing a Pump**—Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

294 **How to Solve Pumping Problems**—A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

When it's too hot to handle...

USE SPENCER HARTFORD VACUUM

- BENCH CLEANING
- METAL RECLAIMING
- MILLING CHIPS
- SOAKING PITS
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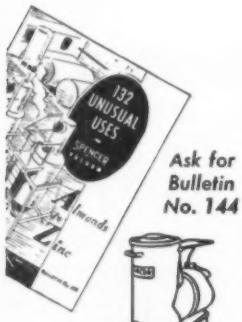
- TANK CLEANING
- TIN PLATE CLEANING
- WELDING FUMES AND
- FLUX AND
- ALL AROUND
- SANITATION

Tedious — and expensive jobs are eliminated in more than 100 ways with Spencer Vacuum. Hundreds of special vacuum tools have been devised — for vacuum units ranging from 1½ to 100 H.P. Smaller sizes for your offices. Spencer Vacuum is used in metal cutting, or for reclaiming gold, babbit, solder and welding flux.

Also, with the same equipment you can remove water, hot ashes and chemical dusts at the point of generation. And with all, you can clean the entire plant including walls, ceilings and overhead pipes, with the same equipment.

A few of the portable systems are shown below. For larger jobs a Spencer Stationary System is preferred. Let our representative look over your plant and recommend.



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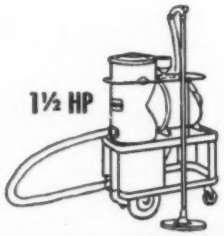
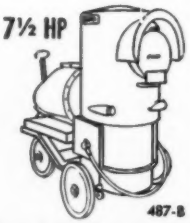
1 HP



1½ HP



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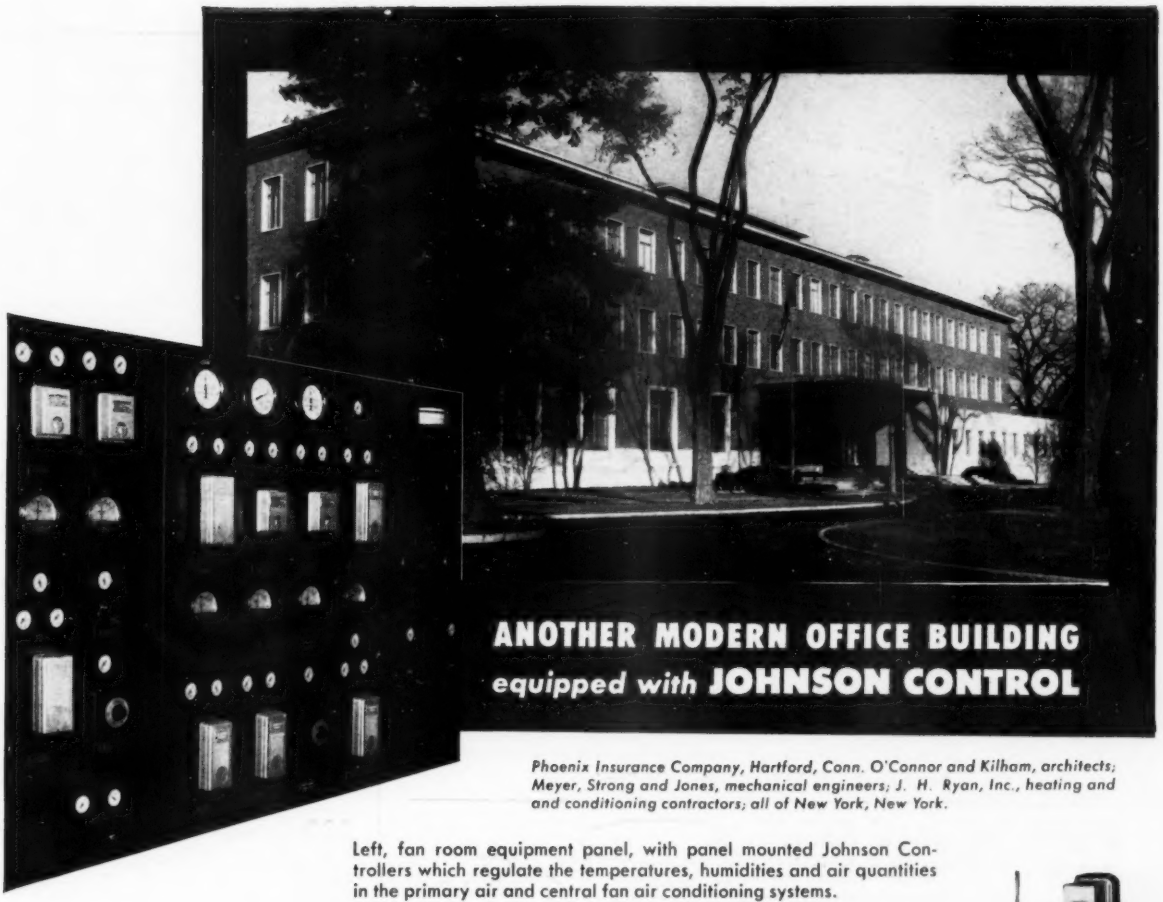

ANOTHER MODERN OFFICE BUILDING *equipped with* JOHNSON CONTROL

Phoenix Insurance Company, Hartford, Conn. O'Connor and Kilham, architects; Meyer, Strong and Jones, mechanical engineers; J. H. Ryan, Inc., heating and and conditioning contractors; all of New York, New York.

Left, fan room equipment panel, with panel mounted Johnson Controllers which regulate the temperatures, humidities and air quantities in the primary air and central fan air conditioning systems.

Among the many notable features of the Phoenix Insurance Company's modern office building in Hartford is a specially designed all-weather comfort control system by Johnson.

Here, 145 Johnson Heating-Cooling Thermostats operate Johnson Valves on the hot and cold water supply to individual room air conditioning units in spaces on the periphery of the building. Johnson *Individual Room* Thermostats operate Johnson Volume Dampers to insure year 'round comfort in the interior zones.

In addition to the *individual room* temperature control, behind the scenes other Johnson apparatus operates Johnson Valves and Dampers to regulate temperatures and humidities of the air supplied by the primary air and central fan air conditioning systems serving the individual room units and the interior zones of the building.

Johnson "Planned-for-the-Purpose" Control Systems are designed specifically for each individual installation. That is why you find Johnson Control not only in outstanding office buildings, such as the Phoenix Insurance Company, but in countless schools, hospitals and every other type of public, commercial and industrial building as well.

Take advantage of the nearly 70 years of experience of the Johnson nationwide organization. It is at your disposal without obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

T-400 Room Thermostat

T-271 Heating-Cooling Thermostat for Room Air Conditioning Units

D-251 Piston Damper Operator

V-152 Water Valve for Room Air Conditioning Units

JOHNSON *Automatic Temperature and Air Conditioning* **CONTROL**

MANUFACTURING • PLANNING • INSTALLING • SINCE 1885

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Materials HANDLING EQUIPMENT

Item NS-364
SHEET STEEL GRAB
Item B-768
Heavy Duty DIE TRUCK
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WOOD BOX metal bound
Item D-28 (Box)
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Sloped Bottom BOX and STAND
For simplified handling of parts, economically. Hand lever releases parts to waist-high tray on stand for easy disposal. Furnished with stacking brackets or crane lugs for platform or fork truck. Made of heavy duty all-steel reinforced construction.
Item B-218
WELDER'S TRUCK
Item B-731
$181.50
DRUM and BARREL TILT
A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360°. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.
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MACHINE TENDER on wheels
WHEN ORDERING always give "item" number ALL PRICES are f.o.b. Detroit Prices are subject to change without notice
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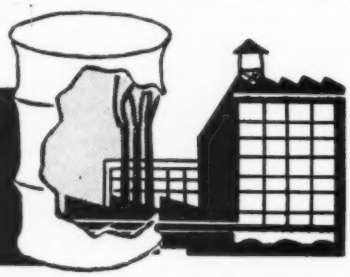
For more facts circle 619 on Reply Card

SIMPLIFY and SAVE on lubricating work with

ALBANY PRESSUREGREASE Universal



Hundreds of plants now use this Improved All-Purpose Lubricant for:

Albany Pressuregrease Universal takes the place of four or more separate greases used heretofore . . . cuts down inventory and calls for only one grease gun . . . speeds up lubrication work and saves you money.
Engineers like the way Albany Pressuregrease Universal clings to metal at all temperatures. Its high resistance to moisture prevents rust. Assures cleaner floors because it will not run off at high temperatures or high speeds. Ask for it at your mill supply house.

1. Regular Pressure Grease
2. Ball and Roller Bearing Grease
3. Water Pump Grease
4. Universal Grease and for many other types of equipment

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FREE: Send today for helpful copy of Albany Recommendation Chart

Albany Lubrication Products

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DATA FILE

(Begins on page 178)

295 **Pump Service Manual**—Bulletin 202 is a 20-pp booklet covering installation, operation and maintenance of manufacturer's reciprocating pumps and providing helpful engineering information. Suction piping, valves and accessories for proper operation are discussed. Sectional drawings and parts lists are provided, also high and low capacity steam consumption curves, information on water, steam properties. Warren Steam Pump Co., Inc.

296 **For Abusive Pumping Jobs** — Catalog 4906, 36-pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

297 **"A Turn for the Better"** — Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump. Pump Div., Robbins & Myers, Inc.

298 **Centrifugal Compressors** — Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements, and methods of control are presented. American Blower Corp.

299 **Multi-Stage Compressors**—Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

300 **Air Compressor Selection Data**—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single-and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

PACKINGS, GASKETS, SEALS

302 **Packings and Gaskets**—In this 40-pp belting and packing manual (NY-2697-P) are helpful charts plus information on the care, use and maintenance of rod and sheet packings and gaskets. A complete engineering section contains all necessary charts and tables for determining working specifications of packings. Also included are packing recommendation charts. New York Belting and Packing Co.

303 **Braided Rod Packing**—This 8-pp bulletin outlines advantages of company's lattice-braid rod packing. Contains sectional drawings, showing their unique structure, illustration of types available, tables of service recommendations, specifications. The Garlock Packing Co.

304 **Metallic Packing** — This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co.

INSULATION

305 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

306 **Improved Heat Insulation**—This 8-pp bulletin describes Super-Light 85% Magnesia for temperatures to 600 F, available in cement blocks, pipe sections. Twelve advantages of this lightweight insulation are detailed. Recom-

HEAR HERE

NEW Model 45 Acousti-Booth — spacesaving configuration provides amazing acoustical performance.

50% Reduction in loudness of noise — 14 db attenuation — provides full-length Booth performance.

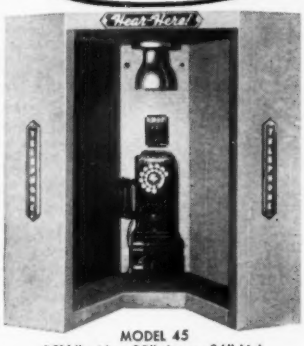
New triangular configuration permits 7 spacesaving multiple Booth arrangements.

All steel, doorless construction — silver gray hammered finish — easy installation — no maintenance.

WRITE for Bulletin A-131 for details, including auxiliary floor stand, light fixture, and brackets.

ORDER TODAY

ONLY $100.00
F. O. B. CHICAGO
light fixture extra



MODEL 45
35½" wide—32" deep—36" high.

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ADSCO SEPARATORS INCREASE EFFICIENCY

In Power, Process, or Heating Operations

HORIZONTAL TYPE

For high efficiency and low cost, use ADSCO Separators to remove condensate, oil, and minor solids from steam, air, and gas lines. Made in vertical up-flow and down-flow, horizontal, and receiver types. ADSCO Separators are of simple design, have low pressure drops, and are available in a wide range of working pressures and temperatures. Write for Bulletin 46-50B.

VERTICAL TYPE

AMERICAN DISTRICT STEAM COMPANY, INC.
GENERAL OFFICES
NORTH TONAWANDA, NEW YORK
PLANTS: NORTH TONAWANDA, N. Y. — RICHMOND, CALIF.

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EXPERIENCE PROVES *Koiled Kords* are built for heavy duty service . . .

Photograph courtesy of International Harvester Company, Louisville, Kentucky.

FIVE YEARS of continuous service ON MONORAIL HOIST.

Foundries are tough on flexible cord. But in one foundry, built five years ago, where KOILED KORDS retractile cords were installed originally on all monorail hoists, cord maintenance trouble has been practically non-existant. Eighty to eighty-five per cent of the cords have been in continuous use for the entire five year period. KOILED KORDS retractile cords are specially constructed to withstand rugged industrial conditions. They endure repeated cycles of extension and retraction without failure. The neoprene jacket withstands oil, grease, chemical fumes and abrasion.

KOILED KORDS retractile cords are available in Type SV, SJO, and SO, Underwriters' approved. They extend to approximately five times their retracted length.

Write for booklet showing many applications.

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Incorporated

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Oshawa, Ontario

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MODERN WASHING FACILITIES

FOR OFFICE

AT LEFT:
Duo-Washfountains serve one or two persons.

AND FACTORY

54-inch full-circle Bradley with Mosinee towel cabinet.

SAVE WATER WASTE AND TIME

● Without faucets to touch or maintain, sanitary Bradley Washfountains provide clean running water from a central sprayhead. The self-flushing bowl prevents collection of contaminating water,—and foot-control automatically cuts off water supply when foot is removed from control ring or pedal.

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Distributed Through Plumbing Wholesalers

For more facts circle 625 on Reply Card

DATA FILE

(Begins on page 178)

mended thickness, physical characteristics, prices are given. Also included is information on combination coverings with Tempchek inner layer for temperatures from 550 to 1500 F. The Philip Carey Mfg. Co.

307 Flexible Duct Insulation—Form F-180 describes and gives product specifications for fiber glass flexible duct insulation. Advantages are cited, and easy installation procedure is illustrated. Also included are data on thermal insulating and acoustical insulating qualities. Fiber Glass Div., Pittsburgh Plate Glass Co.

MECHANICAL POWER TRANSMISSION

309 Power Transmission Equipment—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

310 Improved V-Belts—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

311 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

312 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

313 Coupling or Converter—To promote a better understanding of hydraulic couplings and torque converters, this 32-pp publication tells where couplings or torque converters should be used, and why, furnishing a source of facts on non-technical terminology. Covers meaning and characteristics of torque and effect on driving and driven equipment. Twin Disc Clutch Co.

314 Transmission, Control Equipment—Variable speed transmission and speed control devices are presented in 48-pp Catalog 45. Fully illustrated, provides descriptive and application information, operating principles, dimensional tables. More than 60 photos show use of this power transmission equipment in paper mills, food processing plants, textile plants automotive plants, power plants, others. Lewellen Mfg. Co.

SANITATION

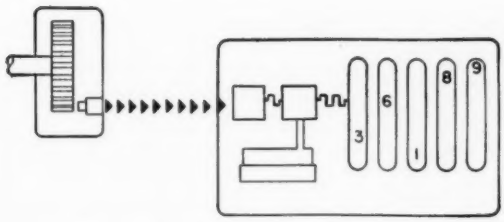
316 Advice on Washrooms—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

317 Hand Dryer—Form 1123 describes and pictures a high-speed hand and face dryer for use in industrial washrooms. Tells special features. The Chicago Hardware Foundry Co.

318 Group Washing Equipment—Washfountains designed for modern group washing requirements for industrial plants, institutions are shown in Bulletin D-766. Bradley Washfountain Co.

HEATING, COOLING

319 Forced Air Space Heaters—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, proc-



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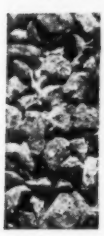

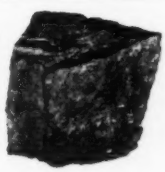

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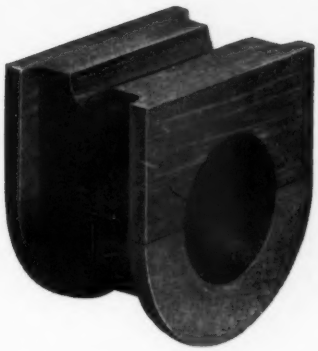

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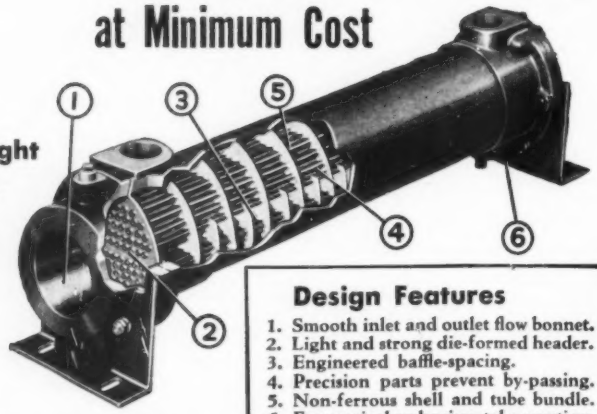

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DATA FILE

(Begins on page 178)

ess drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

320 **Buying a Portable Heater?**—Stressing safety factors involved, this 40-pp booklet, "Guide to the Selection and Use of Portable Space Heaters," analyzes temporary heating equipment from standpoints of personnel well-being, property protection and fire and accident prevention. Classifies basic types of direct, indirect-fired heating devices. Herman Nelson Div., American Air Filter Co., Inc.

321 **Engineering Data for Heating Systems**—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. C. A Dunham Co.

322 **Utility Heaters**—Fully illustrated, Catalog 6253 presents heaters for use in mobile units and small space heating requirements. Includes capacity and design information. Young Radiator Co.

323 **Industrial Dry Coolers**—Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

324 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

ELECTRICAL EQUIPMENT

326 **Motor-Generator Reference Book**—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their application and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control. Allis-Chalmers Mfg. Co.

327 **Productive Maintenance** — Publication GED-1691 is a pocket-size 104-pp source of information of value to plant engineers who want to get more production from their present motors, generators and control equipment. Besides general maintenance suggestions, the booklet contains trouble shooting charts and recommended renewal parts guides. Also provides wire and cable data and includes a section of

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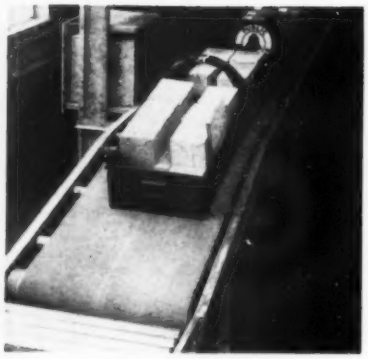

18 Western Electric Operations Use Imperial Belts

From Watertown, Mass., to Emeryville, Calif., and at operations in 16 cities in between, Western Electric Company uses Imperial Belts for many conveying jobs. In the Point Breeze Works, at Baltimore, an Imperial Belt moves heavy telephone cable terminal assemblies (left photo). At Western's Kansas City Distributing House another Imperial serves a general-duty conveyor (right photo).

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DATA FILE

(Begins on page 178)

formulas and other data pertaining to motors and generators. General Electric Co.

328 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

329 Motor Controls—In this 28-pp bulletin the most important items in company's line of standard motor control apparatus for all industries are presented. Controls, starters and accessories are described and applications listed. Allen-Bradley Co.

330 The Answers on Wiring—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths, as well as a partial list of users included. General Cable Corp.

331 Power and Control Cables — Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

332 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

333 Industrial Truck Batteries — Bulletin IT-520 covers company's complete line of industrial truck batteries and gives details such as dimensions, wet and dry weights, types of containers, and capacities at the 6- and 8-hr rate. C&D Batteries, Inc.

336 Battery Maintenance Tips—Form 5063 is an 8-pp pocket-size booklet on storage battery maintenance which breaks down battery care to seven basic rules, each emphasized by cartoon treatment and brief text. Booklet is suited for distribution to maintenance personnel as well as to those indirectly associated with batteries, such as purchasing department personnel. Includes suggested maintenance chart forms. Exide Industrial Div., The Electric Storage Battery Co.

337 What You Should Know About Circuit Breakers—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

338 Toggle Switch—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches, which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis Honeywell Regulator Co.

339 Commutator, Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their correction; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

340 Flexible Cords — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dyna-

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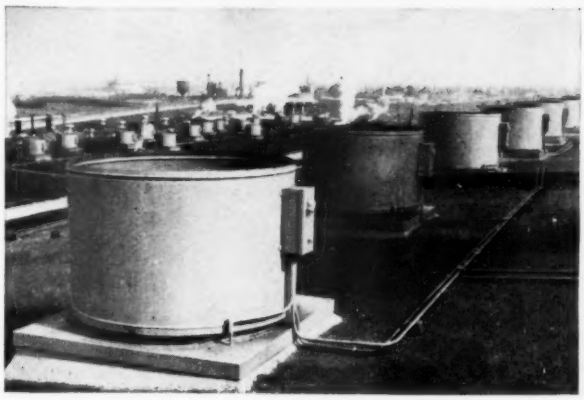

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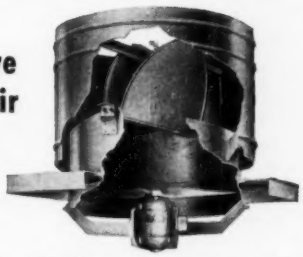

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For more facts circle 639 on Reply Card

DATA FILE

(Begins on page 178)

These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

OTHER EQUIPMENT

355 Oil Cooling Equipment—Catalog FB-1052, 20 pp, discusses controlled quench oil cooling for uniform quality in heat-treated metals. Describes and illustrates typical installations of coolers; tells how to select cooling systems; and gives circulation rates. Charts show oil recirculation for batch quenching, determination of amounts of oil required. Illustrates accessories. Bell & Gossett Co.

356 Continuous-Cast Bronzes—This 12-pp bulletin describes, illustrates Asarco continuous-cast bronze products including copper alloy rods, valve guides, air brakes, packaging machinery. Tables include typical physical properties of foundry alloys cast by three methods; impact tests revealing high safety factor for heavy-duty parts. Lists specifications, sizes, weights on rods, bars. American Smelting and Refining Co.

357 Cold-Finished Steels — Ten grades of cold finished case-hardening Jalcase steels are discussed in Bulletin AD-6. 14 pp. Describes properties of this free-machining open hearth steel as easy machinability, minimum distortion, faster heat treatment, high water resistance. Jones & Laughlin Steel Corp.

358 Socket Head Fasteners—Advantages of companys' screw products are described in this folder. Included are socket head cap screws, shoulder screws, flat head socket cap screws and button head socket screws. Also described are socket screw keys, square head set screws, pressure plug and dowel set screws, pressure plug. Standard Pressed Steel Co.

359 Plumbing, Heating Supplies—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated, gives sizes, intended uses and ordering information. J. A. Sexauer Mfg. Co., Inc.

360 Industrial Leathers—These illustrated data sheets cover company's leather products and include specifications on various types of leather belting. Also gives data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

361 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion, air. Also covers increased boiler output, ability to use lower grade fuels, other advantages afforded. Booklet contrasts regenerative with recuperative preheaters; explains operating principle and structural details of the Ljungstrom air preheater. Industrial applications for other than power boilers are covered. Air Preheater Corp.

362 Blast Cleaning Accessories Guide—Bulletin 300C is a 28-pp booklet describing accessories and supplies available for use with company's blast cleaning equipment. Includes engineering selection data as well as specifications. Space is also devoted to selection of abrasives according to cleaning requirements. Pangborn Corp.

363 Industrial Ovens — Thirteen types of company's Convectioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

364 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled "Here's How to Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

365 Industrial Equipment — Bulletin WP-1099-B61, 16 pp, describes manufacturer's industrial equipment including centrifugal refrigeration systems, condensers and coolers, steam power plant equipment, water conditioning deaerators and rotary pumps. Gives features, types, sizes, capacities, and describes their application. Worthington Corp.

366 Neoprene Design Book—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

367 ABC's of Dryness—Eight-pp Bulletin 16.0.081 presents packaged dehydration units for efficient drying of air or other gases. Tells what these dryers can do, what they will remove dryness from and where they are recommended for use. Explains drying operation; discusses adsorbents and equipment utilized, giving construction details and sizes offered. Typical arrangements for both full-stream and split-stream reactivation are diagrammed, and selection information included. Equipment Div., J. F. Pritchard & Co.

368 Flux Recovery Equipment—How company's flux recovery equipment salvages valuable flux, saves man-hours, and speeds and improves welding is told in this 6-pp illustrated bulletin. Describes primary separator and feed tank. Pictures some typical recovery installations. Invincible Vacuum Cleaner and Mfg. Co.

369 Air Conditioning Filters—Bulletin 600, 8 pp ,describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance, and installation data covering dry type panel filters, for the removal of air-borne impurities given. Dollinger Corp.

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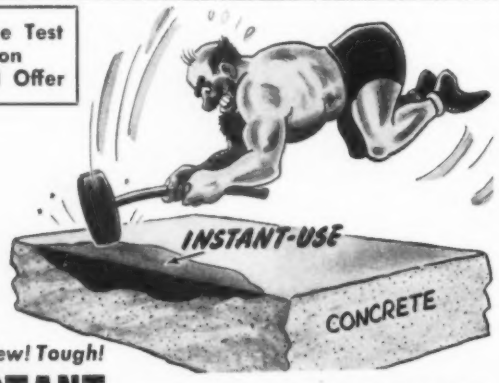

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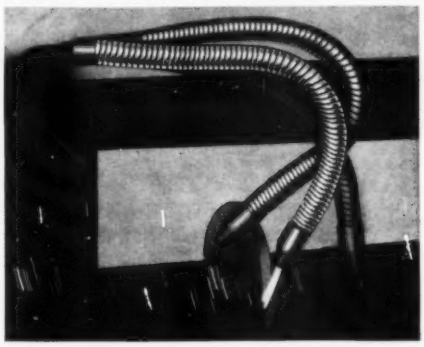

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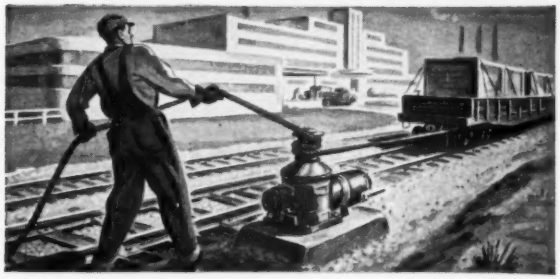

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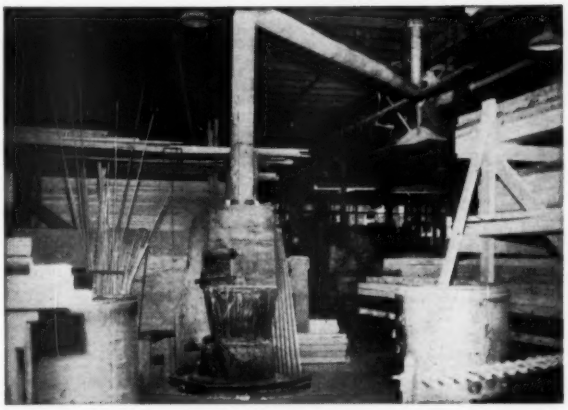

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DATA FILE

(Begins on page 178)

prene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

341 **Retractile Cords**—This 8-pp bulletin presents retractile cords for general communication and power applications. Containing catalog data and ordering information as well as application photos, explains how the cords are made, where used, and advantages offered. Koiled Kords, Inc.

LIGHTING

343 **Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

344 **Lighting Fixtures**—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting, Inc.

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345 **Boiler Reference Guide**—General Catalog 80, 32 pp, contains latest and most complete data on manufacturer's line of high and low pressure steel boilers for heating, power and process steam. Also includes descriptions of water heating products, both direct fired and storage types, as well as indirect water heating coils. Information on boiler support brackets, structural steel suspension and induced draft fans are also provided in this technical manual. Kewanee-Ross Corp.

346 **How Much for Steam**—This is a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

347 **Steam Generators**—Data and specifications for completely plant assembled water-tube steam generators are contained in this 8-pp bulletin. They cover nine sizes from 5,300 to 33,000 lb steam per hour and for pressures up to 400 psi. These units are designed for fully automatic firing with oil, gas or stoker-fired coal. Superior Combustion Industries, Inc.

348 **Water Tube-Steam Generator**—Bulletin SB-51, 16 pp, discusses features of Keystone two-drum water tube steam generator for delivery of low cost steam. Cites advantages of conservative boiler rating (full five sq ft of heating surface for each developed horsepower), automatic controls, easy installation, fast steaming qualities, compact size. Gives specifications on all materials furnished, includes accessories. Erie City Iron Works.

349 **Improved Steam Generator**—Bulletin 2000, 28 pp, explains advance design features that distinguish this manufacturer's generator from other unit steam generators. Describes and illustrates engineering differences of component features. Also shows how these components are constructed, assembled and tested. Another section gives data and dimensions and standard and accessory equipment for the units from 20 to 6000 hp for pressures to 250 psi. Preferred Utilities Mfg. Corp.

WATER TREATING

350 **Information on Ion Exchangers**—Here are three booklets on ion exchangers: Nalcite HCR, a styrene type cation exchanger; Nalcite SAR, a basic anion type; and Super Nalcolite, a synthetic gel type zeolite for cation exchange. Tables and graphs explain performance of these water treating resins under various operating conditions. Physical characteristics, exchange capacities, regeneration techniques discussed. Bulletin 57, 20 pp, is on Nalcite SAR; Bulletin 58, 28 pp, Nalcite HCR; Bulletin 59, Super Nalcolite. National Aluminate Corp.

351 **Shutdown Safeguards** — "Laying Up Equipment" is a 6-pp folder devoted to the problem of safeguarding steam boilers, turbines and other water using equipment when "laid up" during shutdowns. Cites examples and suggests various methods used for protecting such equipment. Hall Laboratories, Inc.

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352 **Condensate Line Corrosion**—Attributing condensate line corrosion chiefly to carbon dioxide in the steam and water, Technical Paper 127 discusses various methods of minimizing boiler feedwater alkalinity, especially the use of filming amines. Reports field results under various conditions. W. H. & L. D. Betz.

TUBING, HOSE

353 **Metal Hose Manual** — Technical Data Book U-111, 24 pp, includes information on application, temperature ranges of various types of metal and wire braided hose, dimensions, couplings, assemblies. Types of hose manufactured by this company are illustrated and described, including seamless all-metal flexible pressure hose; interlocked suction, blower and conveyor hose; square locked conduits and flexible spout tubing; double wire-braided hose for high pressure. Universal Metal Hose Co.

354 **Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing.

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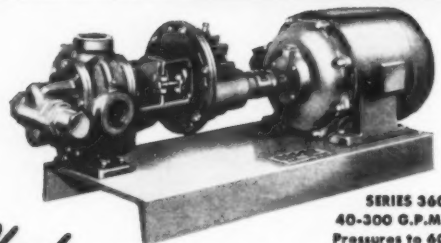

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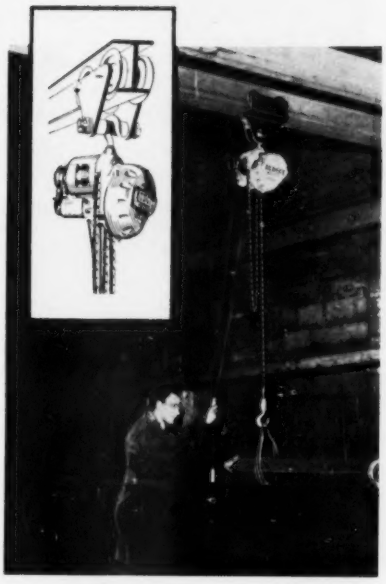

LIFTS MORE FOR LESS

Modern load-handling equipment is now the only source of major production economies. That is why the cost-cutting 'Budgit' Electric Hoist is at work in more plants than ever. It eliminates the fatigue and hazards of manual lifting. A slight pull on the control cord with one hand starts effortless hoisting action. Spur-geared speed and efficiency reduce waiting time between production operations. It's miserly in power consumption — uses only a few cents' worth of electricity a day.

The 'Budgit' is a complete, portable electric hoist. No accessories to buy. No installation expense. Just hang up, plug in, and use! Rugged construction assures long, attention-free performance. Operator, load, and hoist are fully protected by powerful, automatic load and motor brakes; a tough load chain that will not stretch nor bind; and non-fracturing hooks. Capacities: 250 to 4,000 lbs. AC and DC models. Prices start at $139. Write for Bulletin 391.

'BUDGIT' CONDUCTOR CORD TROLLEYS keep flexible conductor cord up and out of the way while carrying electricity to monorail hoists. They operate on same track as the hoist and roll smoothly around curves and switches.

MAXWELL MANNING MOORE INC. TRADE MARK

'Budgit' ®

ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

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these HARTZELL fans will blast away the heaviest concentrations of heat, dust and fumes

Hartzell cool blast and utility fans eliminate threatening concentrations of heat, dust and fumes before they can start trouble. That's good for production. It means higher morale, increased efficiency. Errors, accidents and absenteeism are reduced.

These sturdy Hartzell fans are built to take a beating. They're powerful brutes — designed for strength and long life. You couldn't use one in your office (they're too powerful), but out in the plant their ruggedness will really pay off.

Woven steel wire guards are guaranteed to pass all safety codes. For ease of maintenance, motors are mounted outside the guard.

For complete details, write today for your free copy of Bulletin A-109. It's chock full of valuable air-moving information.

UTILITY FAN

Stand it on the floor or mount it on wall or ceiling. Fan turns vertically in a full circle, locks in any position. 14" to 36". Sizes 24" and up also available mounted on sturdy two-wheeled carriage.

COOL BLAST FANS

Portable (shown at right) and stationary (shown in installation photo) models, 22" to 40". Heavy-duty model with cast iron base designed to be anchored to the floor, 44" to 60". Air deliveries to 60,000 CFM.

HARTZELL propeller fan co.

Div. of Castle Hills Corp.

Dept. S

PIQUA, OHIO

PROPELLER-TYPE FANS • BLOWERS
ROOF VENTILATORS • UNIT HEATERS

ENGINEERING OFFICES IN PRINCIPAL CITIES

Name _____
Company _____
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City & State _____
If student, check here for special information ☐

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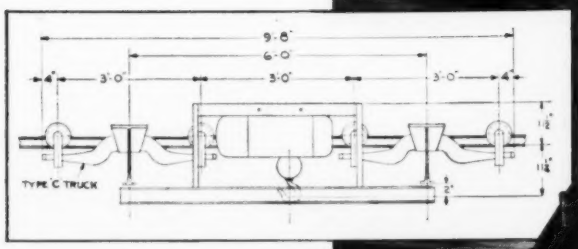

Lifting this three-ton condenser and moving it about is made an easy one-man job with the Tramrail crane.

HIGH LIFT UNDER LOW ROOF *Solves Handling Problem*

A double-girder, high-lift Cleveland Tramrail crane proved the solution of a handling problem at The Refrigeration Engineering Co., Los Angeles, Calif., manufacturers of evaporators and condensers of all sizes up to 100-ton rating.

Because many of their units are high and heavy, and the roof is very low, it was necessary to develop a special crane design that permits utilizing space between the crane girders. How well this was engineered is evidenced by the fact that while the distance from floor to the low part of the roof truss is only 11'-10¼", the hoist hook can be raised 10'-0" above the floor.

The crane and hoist are motor-driven, push-button controlled. The trolley is hand-propelled. The hoist has a capacity of three tons and travels at 18 feet per minute.

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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THE CLEVELAND CRANE & ENGINEERING CO.
7520 East 284th St., Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

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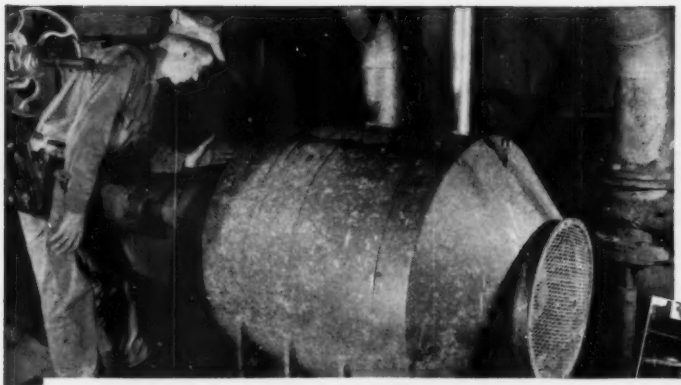
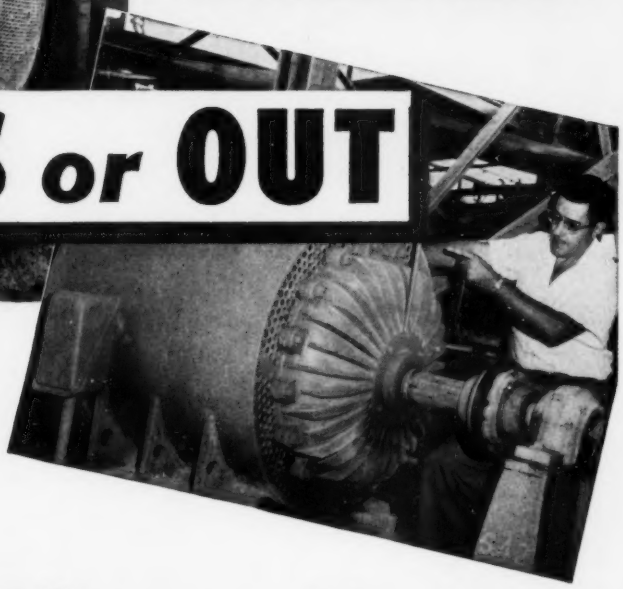


Totally-Enclosed
Fan-Cooled
MOTORS

INDOORS or OUT



DIRT and CORROSION

Can't Hurt These Motors

Here is a totally-enclosed type of motor that will solve many of your dirt and corrosion problems. Install anywhere, indoors or out.

Cooling System is Self-cleaning

Cooling air is carried through the heat-exchanger tubes with sufficient velocity to expel practically any kind of dirt. If oily or sticky dirt should cling, tubes can be ramrodded clean in a few minutes because tubes are straight and tube ends are exposed.

Choice of Corrosion-resistant Materials

You can lick corrosion with this motor, too. Tubes are available in a variety of materials to meet practically any corrosive atmospheric condition. Allis-Chalmers tube-type motors have long and successful experience in such difficult applications as caustic plants, refineries and petrochemical plants, power plants with fly ash problems and many others.

Next time you need a motor for a dirty or corrosive location or for outdoor operation in all kinds of weather, call your Allis-Chalmers District Office. Get complete information on Allis-Chalmers tube-type totally-enclosed, fan-cooled and explosion-proof motors. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7149. Available in ratings on frames larger than NEMA 505 up to 3000 hp. A-4222

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

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by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

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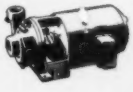
TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.



PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

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AUGUST, 1954

Plant Engineering

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The magazine that helps plant engineers with their everyday problems